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THE AMERICAN GAS LIGHT JOURNAL

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The Public Lighting Tables of the American Meter Company will be found in the page advertisement of that Company.

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[OFFICIAL NOTICE.]

Wrinkle Department, Western Gas Association.

WESTERN GAS ASSOCIATION,
OFFICE OF THE SECRETARY,
NEW ALBANY, IND., Jan. 16, 1899.

To the Members of the Western Gas Association:

Mr. E. H. Jenkins, Editor of the Wrinkle Department, desires it known that those who have contributions to offer for publication in this valuable division of the Association's proceedings, should forward the same at as early a date as possible. Let no member fail to mail Mr. Jenkins a description of any device that saves labor or insures through its use better service in the production or distribution of gas.

Address all communications to Mr. E. H. Jenkins, Engineer Buffalo City Gas Company, Buffalo, N. Y.

J. W. DUNBAR,
Secretary.

BRIEFLY TOLD.

OBITUARY NOTE, GENERAL JOHN W. TURNER.—We regret to have to report the death of General John W. Turner, who passed away, at his home in St. Louis, the morning of the 8th inst., after a short illness. He was born in Malta, Saratoga county, N. Y., July 18, 1833, and was the son of John B. Turner, a well known contractor in the canal enterprises of the State at that time. In 1843 his father removed to Chicago, having secured an important contract in connection with the construction of the Galena and Chicago Railroad, and it was in the now metropolis of the West that the son obtained his education. In 1851 the subject of our memoir was named as a cadet for West Point. Graduating in 1855, his first assignment for active duty was at the frontier post of Fort Dalles, Ore., and his next work was in Florida in connection with the subduing of the Seminole tribe. Then came the war of the Rebellion, in which conflict he actively shared, from its commencement until its termination. He retired from the service September 1, 1871, with the rank of Brevet Major-General, U. S. A. Selecting St. Louis as his home, he ultimately engaged in the lead mining industry of that section, and his trading there was as much of a success as his military career had been efficient. In time he became a prominent factor in the political life of St. Louis, which prominence resulted in his accepting (September, 1877) the post of Street Commissioner, by appointment through Mayor Overstolz. This responsible place was held by him for 11 years, and during his *regime* many of the mud roads of St. Louis were changed into well paved streets. In 1888 he resigned the commissionership to accept the Presidency of the St. Joseph (Mo.) Gas and Manufacturing Company, which place he acceptably filled until the Company's identity was merged into that of the St. Joseph Gas Company—through consolidation with the "properties" of the St. Joseph Light and Fuel Company. While deceased may not have been widely known among the gas fraternity of the country, in that he was not affiliated actively with any of the Associations, it is nevertheless true that his connection with the trade was of the regular order; and it is our satisfactory province to close this brief sketch of his life in the simple statement that its records are of a man whose death is sincerely mourned by those who were closest to him.

DRAWING THE LINE AS TO A PROFITABLE GAS CONSUMER.—Last week we concluded our report of the proceedings of the last annual meeting of the Ohio Gas Light Association, and much of the concluding record was devoted to the contents of the Question Box. Some of the questions were brief enough as to wording, but their brevity did not in any sense mean that an attempt to answer them in a comprehensive way would take up little thought or less time. Going, though, from the questions that would absorb time and thought, there was one query that should have answered itself. Its number was 14, and its words were: "Is it profitable to a company to have a consumer whose bills are less than $8

per year?" Mr. McIlhenny answered it so completely that perhaps words of ours in relation thereto may be all out from necessity, but in any event we will let him again speak for us over the matter by saying that he put it none too forcibly when he declared that a $6 per year consumer can be well counted as of profit to a gas company. In fact, we would even go a bit under the $6 mark, just for the sake of advertisement as it were; or, as Mr. McIlhenny remarked, "We want to make gas a necessity all over town, so that everybody who can possibly use it will use it. We should educate the community to the use of gas, and this is one of the ways by which we can accomplish the desired result." Yes; by all means keep an eye on the $8, or the $6, or the $5 consumer, for it is reasonably certain that the use of gas by such consumers will tend all the time towards a greater than a lesser employment by him of that which you have to supply him.

NOTES.—Mr. F. S. Benson, Jr., son of Col. F. S. Benson, of Brooklyn, N. Y., has been appointed Superintendent of the gas division of the trading of the Charleston (S. C.) Consolidated Railway, Gas and Electric Company.——Mr. Frederick H. Shelton has removed his headquarters from the Drexel Building, Phila., to the Fidelity Building, 112 North Broad street, Phila. The Fidelity Building adjoins the new office quarters of the United Gas Improvement Company.——The Brooklyn (N. Y.) *Standard Union* of the 18th inst. said: "A syndicate headed by Stahl & Straub, bankers, of Philadelphia, have organized the Brooklyn Gas and Electric Light Company, with a capital stock of $2,000,000. This is virtually the reorganized Brooklyn Borough Gas Company, formerly the Coney Island Gas Company, with a capital of $2,000,000 in place of $500,000. The Company has the right to lay mains and supply gas in the 31st Ward.——"F.," writing from Poughkeepsie, N. Y., under date of the 17th inst., says: "The Board of Trustees of the Sing Sing (N. Y.) Gas Manufacturing Company, at a meeting held some days ago, decided to put the selling rate at $1.50 per 1,000 cubic feet, without discount. The concession becomes operative the 1st prox."——Mr. C. S. Benson, President of the St. Cloud (Minn.) Water, Light and Power Company, has been investigating various methods proposed to him for the improvement of the Company's gas plant—a naphtha process is now in use there. It may be taken for granted that if his investigation causes him to make a change, any change will result in benefit to the Company.——The proprietors of the Consolidated Gas and Electric Company, of Batavia, N. Y., have purchased the Loomis gas outfit, formerly and originally constructed for the supply of fuel gas to the residents of Attica, with the intention of increasing the generating capacity of the Batavia works.——The proprietors of the Williamsport (Pa.) Gas Company have decided to make important main extensions, in addition to those heretofore planned. The plans so far prepared call for the placing of 11 miles of pipe, chiefly in the western section of the city.——The Standard Gas Light Company, of New York, has placed an order with the United Gas Improvement Company, under which the latter is to erect generating apparatus, of its improved double-superheater type, up to a daily product of 4,500,000 cubic feet. This is the third order that the Standard Company has placed for apparatus of the type named. The new machinery will be erected in the Company's 115th street station, in a building designed for its housing.——The reorganization of the Easton (Pa.) Gas Company will be completed the first of May. The Easton *Argus*, speaking to this subject, says: "While the Easton Power Company, manufacturing electric light, and the Easton Gas Company, furnishing gas, are separate and distinct corporations, it is the intention of the gentlemen interested in both Companies to run the plants in harmony." In all these reorganizations it seems that the "big prices" are paid for the gas plant ends of the harmony; which is as it should be.——Under an agreement recently completed the gas and electric lighting interests of Bergen county, N. J., are mutually in accord.——The dollar gas rate on private account, and the 50 cent rate on public account, just announced by the owners of the Nashville (Tenn.) Gas Light Company, will not afford much comfort to the gentlemen who are so heavily interested in the electric lighting enterprises of that city. The plain fact of this announcement is an odd one, in that it shows a record of the cheapest (quality being considered) gas sold in the world. An 18 candle gas is distributed in Nashville, and that quality, at 50 cents per 1,000 cubic feet, puts the celebrated Leeds (England) article completely in the dark. The Nashville act may also lead to a peaceful solution of the present heroic gas war in New York, in that the proprietors of the Consolidated Company might be led to put the price permanently at a figure which would end all trouble over the gas supply, no matter whether such trouble originated in Albany, in Tammany Hall, or in Whitney's electricville.

[Prepared for the JOURNAL.]

Some Forms and Their Uses.

By MR. WALTON FORSTALL, Phila., Pa.

The forms as hereafter given were used in a Company with an annual output of 25,000,000 cubic feet, but are suitable for concerns with as low as 10,000,000 or as high as (say) 100,000,000, where the superintendent can have personal knowledge of almost all happenings, and, therefore, has no need of elaborate card records. None of the forms shown are original as to general idea, the writer having copied them from various sources, making modifications, if necessary, to suit local conditions.

Beginning at the place where, in the old days, all the profits were supposed to be made, we have the "Retort House Report," which we shall call Form I. The "yield" was figured in the works' offices, and

Form I.

Retorts in use ... .GAS COMPANY. Weather.....
Benches..... Temp. 8 A.M.....
Coal used .....
Yield .....
RETORT HOUSE REPORT.
7 A.M.....189.. to 7 A.M.....189..

Bench.	1		2		3		4		5		6		Photometer.	Exhauster Pressure.
Time.	Lbs. Coal	Retrts	Lbs. Coal	Retrts	Lbs. Coal	Retrts	Lbs. Coal	Retrts	Lbs. Coal	Retrts	Lbs. Coal	Retrts		
8 A.M.	....	...	....	...	....	...	....	...	....	...	....	...	... ..	.....
9 "	....	...	....	...	....	...	....	...	....	...	....	...	.....	.....
Etc.	....	...	....	...	....	...	.. .	...	....	...	....	...	.....	.....

Lbs. as Fuel.....
Total Coke.....
Coke as Fuel.....
Per Cent. of Coke as Fuel.....
Cannel Coal used .....
Scurfed Retort.....Bench.....Hours.....
Remarks.....

so was the "percentage of coke as fuel." The "total coke" was estimated from coal charged, while "coke as fuel" followed in the same way from the number of retorts fed into the generator furnace. The column "Retorts" showed the number charged corresponding to the weight under "Lbs. Coal." "Photometer" was put in because of a Jones jet photometer in the exhauster room, that gave the stokers some idea of what quality gas was being made. "Exhauster Pressure," viz., the pressure the exhauster was working against, was recorded hourly here, in addition to the record as hereafter shown, in order that the stokers (the only men on duty at night) should know when pressure reached the blowing point of the purifiers; a condition, alas, that happened often in winter with a big make and small boxes. As will be realized from the above description, Form I. was filled out by the head stoker.

All other manufacturing data were shown on Form II., "Temperatures, Pressures, Meter and Holder Readings." The descriptions under "Location" refer to pressures, except and where "Temp." is printed, and at such points there were dairy thermometers inserted in inch pipe holders, projecting into the stream of gas, and numbered to correspond with the left hand column of Form II., so any one though ignorant of gas apparatus could make a tour of the works and properly record all readings. Ordinarily this was done by the works' clerk; on Sundays by the head stoker. Most of the pressures were obtained from a board in the office, connected by ¼-inch pipe to the points of interest, and arranged to show in one gauge, pressures from any point. In case of sudden stoppages such a board immediately locates the trouble, and the author is thankful to the "Wrinkle" that gave him the idea. As a safeguard, a place was provided at each apparatus for affixing a gauge in case the line to the pressure board stopped up.

The blank spaces in Form II. were left for future apparatus, such as 7 and 8 for a tar extractor, where a pressure reading might sometimes tell a good deal, and temperatures ought always to be known. At the time the form was made it was thought that the four existing purifiers would be changed to two, therefore two spaces were left blank for both temperatures and pressures. As in winter the purifiers were maintained at certain temperatures, by steam coils in the bottom of the boxes, the thermometer readings were quite important. The make of gas was corrected from the meter outlet temperature, but that at the inlet often

explained the formation of naphthaline there. The holders were read three times a day, the afternoon hour varying with the season, according to a regular schedule, so that day and night output could be compared year by year, and the effect of gas stoves sales clearly shown.

In the line for the change of purifier the number of the box was given, and also letters of the batches of oxide on and off. These, with the meter reading at the time of change, gave all data for a complete history of each batch from birth to death.

Form II.

.....GAS COMPANY.

TEMPERATURES, PRESSURES, METER AND HOLDER READINGS.

7 A.M.....189.., to 7 A.M .....189..

No.	10 A.M.	1 A.M.	4 P.M.	7 P.M.	10 P.M.	1 A.M.	4 A.M.	7 A.M.	Aver'ge	Location.
1	....	....	....	....	....	....	....	....	....	Hydraulic Main No. 1.
2	....	....	....	....	....	....	....	....	....	" " " 2.
3	....	....	....	....	....	....	....	....	....	" " " 3.
4	....	....	....	....	....	....	....	....	....	Foul Main.
5	....	....	....	....	....	....	....	....	....	Temp. Exhauster.
6	....	....	....	....	....	....	....	....	....	Outlet Exhauster.
7	....	....	....	....	....	....	....	....	....	
8	....	....	....	....	....	....	....	....	....	
9	....	....	....	....	....	....	....	....	....	Temp. Condenser.
10	....	....	....	....	....	....	....	....	....	
11	....	....	....	....	....	....	....	....	....	Inlet Scrubber.
12	....	....	....	....	....	....	....	....	....	Temp. Inlet Scrubber.
13	....	....	....	....	....	....	....	....	....	Outlet Scrubber.
14	....	....	....	....	....	....	....	....	....	Temp. Outlet Scrubber.
15	....	....	....	....	....	....	....	....	....	
16	....	....	....	....	....	....	....	....	....	
17	....	....	....	....	....	....	....	....	....	Temp. Purifier No. 1.
18	....	....	....	....	....	....	....	....	....	" " " 2.
19	....	....	....	....	....	....	....	....	....	"
20	....	....	....	....	....	....	....	....	....	"
21	....	....	....	....	....	....	....	....	....	Inlet Purifier No. 1.
22	....	....	....	....	....	....	....	....	....	" " " 2.
23	....	....	....	....	....	....	....	....	....	"
24	....	....	....	....	....	....	....	....	....	"
25	....	....	....	....	....	....	....	....	....	Inlet Meter.
26	....	....	....	....	....	....	....	....	....	Temp. Inlet Meter.
27	....	....	....	....	....	....	....	....	....	Outlet Meter.
28	....	....	....	....	....	....	....	....	....	Temp. Outlet Meter.
29	....	....	....	....	....	....	....	....	....	" " Holder.
30	....	....	....	....	....	....	....	....	....	Meter Reading.
31	....	....	....	....	....	....	....	....	....	Air Temperature.

Meter Reading.....P.M.....Midnight.....7 A.M.....
Holder No. 1.....ft....in.....ft....in.....ft....in.....
Holder No. 2.....ft....in.....ft....in.....ft....in.....
Holder No. 1..... 00 cu. ft.....00 cu. ft.....00 cu. ft.....
Holder No. 2.....00 cu. ft.....00 cu. ft.....00 cu. ft.....
Purifier No.....Changed.....M.....Meter Reading.....
Remarks.....

Form II. provides for eight readings every 24 hours; but of these only three were taken, as at night it would have meant lights in dangerous places. It was planned to have electric lights put in (the company was electric, too), and then all the eight readings could be taken.

Every morning the works foreman handed Forms I. and II. to the clerk, who entered their vital points in the "Manufacturing Book," Form III. (the book actually used by the writer was not as shown, as he utilized what he found—a huge book just begun—to save expense, and eked out omissions by ruling additional books). The page should be of proper height to contain the record of a month, with room below for a statement of changes in and present stock of coal, coke, tar and ammonia. If the width necessary for the data shown is thought excessive even for a double page, the insertion of a narrow additional page, as in some forms of consumers' ledgers, will meet the case.

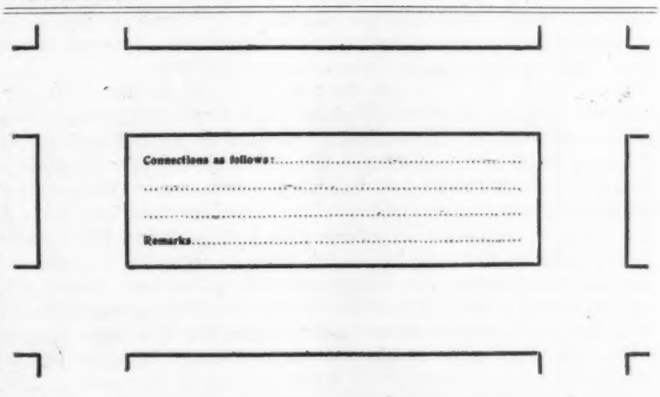
Form III. is designed for the preservation in convenient and compact shape of information in Forms I. and II. Many a time have the holder readings at midnight during the previous winter months been a reliable guide to the amount of gas that would be in stock at the same critical hour on the dark day, that makes you worry over your supply and starts your pencil figuring the chance of grounding. Of the interest attaching to the increase of day sendout I have already spoken. The percentage of increase or decrease in sendout to date in each month, as compared with that of the corresponding month in the preceding year, is a reminder of what is being accomplished, where, as in this case, the same man is responsible for both sales and manufacture. The columns showing the occurrences in the purifying house give necessary data for a complete history of each batch of oxide. The record of pressures would enable slowly increasing stoppages to be detected. The writer fell heir to a tower scrubber that had not been cleaned within the memory of the traditional oldest employee, and that threw 4 inches pressure, presumably from naphthaline, any increase being perceptible only in several months. With the pressure record in the convenient shape as outlined, cases of this kind show up at once when beginning. The temperatures show conditions of manufacture day by day. The whole idea of Form III., as stated before, is to place in convenient shape the facts in Forms I. and II., allowing their destruction.

In the "Oxide Book," which we shall call Form IV. (not shown), every batch of oxide had its own page, upon which was entered the date of each use, the box number and the amount of gas passed. The book is not shown here, as any journal or day book is suitable for the purpose. The number of the box into which the batch went, sometimes gave a clue to poor performances, by indicating the trouble to be in the box itself. When a batch was discarded, addition showed the total amount passed, and division the feet per bushel. Each page was headed with a history of the batch, the date of purchase, when bought, and the cost; or, if made, the ingredients, any peculiarities of making and the cost per finished bushel.

Form V. (not shown) was an ordinary scrap book, arranged with slits so that each day the test paper for H_2S could be slipped in under its proper date and remain on file with its tale of clean or dirty gas.

Turning to distribution matters, FormVI. was convenient for a tem-

Form VI.



Form III. (1st Page.)

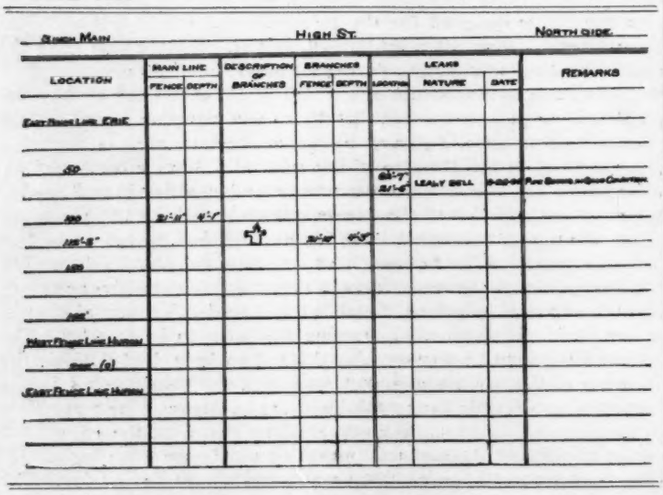
Day of Month	Holder Readings. P.M.	Holder Readings. Midnight	Holder Readings. 7 A.M.	Meter Readings. P.M.	Meter Readings. Midnight	Meter Readings. 7 A.M.	Daily Make.	Daily Sendout. Day	%	Night	%	Total	% Inc. or Dec. to Date	Coal. Bituminous.	Coal. Cannel	Coal. Total	Coke Record. As Fuel.	Coke Record. For Sale.	Yield per Pound	Purifying Record. On Box.	On Batch.	Off Box.	Off Batch.	Gas Proved.

Form III. (2d Page.)

Candle Power	Average Pressures. Exhauster.	In Condenser	In Scrubber.	In Last Box	In Meter	Average Temperatures. Inlet Condenser.	Outlet Condenser.	Inlet Scrubber.	Outlet Scrubber.	Inlet 1st Purifier	Inlet 2d Purifier	Inlet 3d Purifier	Inlet Meter	Outlet Meter	Outlet Holder	Air.	Weather. A.M.	P.M.	Remarks

porary record of the conditions as found when overhauling the mains to reduce leaks. The location of any special, or even a bell uncovered to furnish a start for barring, could be quickly shown for transfer at leisure to the "Main Record Book," Form VII., which was so arranged

Form VII.



that any main location could be put down in its proper place, distances being measured along the street from the nearest fence line (there were no curbs) always from west to east, or south to north. In other words, the book was written up for every street on which mains were known to be, and distances shown between adjacent intersections. O would be the east fence line of Erie street, and 202 (and O in the new count) the east ditto of Huron street. One line of the book was allowed as a rule for every 25 feet, and locations entered at their proper place on the scale, distances out showing in a column to the right. Further to the right were three columns, headed "Leaks," in which could be given the location of all leaks, nature and when fixed. Another column provided for the location of branches and other specials. The idea of this book was to furnish a skeleton form, into which could be filled, each in its proper position, isolated locations of a main system, of which there existed practically no exact data, so that, in course of time, there would result a series of connected locations, from which maps could be made. This problem of arranging in a systematic whole, isolated facts in regard to a practically unknown main system, obtained week by week or month by month, is one familiar to many superintendents, and is the reverse of the ideal condition where the superintendent begins with a new company and maps all his mains as he lays them.

Form VIII., the "Service Return," gives all necessary data, including the men who did the work which, in small companies, is often useful information. Here there is no question of responsibility of foremen, the latter not existing. What the superintendent wants is a record to assist his memory in forming a definite opinion about each of the few laborers who are employed for the summer service work. A few cases of undue settlement, or poor paving against John Jones would end him, and as he knows this when he signs his name to the service return, he has every inducement to do good work. Form VIII. should be filed according to order number and indexed geographically.

In caring for many stove connections, some free and some charged, Form IX. was used. It also affords a record of responsibility for work done.

Form X., "Charge Ticket," took care of any work where material was used, not covered by VIII. or IX. At the end of each month the material in these three forms was added up and charges made against the proper accounts, corresponding credit being given to "Store Room" account from which these materials had been taken. By locking up all expensive articles, it was found that semi-annual inventories of stock tallied closely enough with the ledger footing of "Store Room" account to render unnecessary any more elaborate accounting for material than that outlined.

Form XI. is very simple, but it gave all the needed information for form XII., "Meter Set and Removal Book." The tally of labor and material on meter work was made on Form X.

Form XII. shows compactly the meter changes month by month, and from it the "Consumers' Ledger," Form XIII., was kept up to date. At the end of each month a summary of gains and losses of illuminating and fuel meters was written in Form XII. Facts from

Form VIII.

Service Order No..... No.....Street.

SERVICE RETURN.

.....Gas Company.

.....189....

Owner / Occupant .....

Main is... ... ft.....in.....Fence Line.

Depth Main.....ft.....in. Size Main.....in.

Size Tap.....in. Tapped on..... Size Service.....in.

Drips to..... Kind of Service Coating.....

Service is.....ft.....in..... ..... Fence Line.....Street.

" ..... " ..... " ..... House Line No.....

Nature of Soil.....

Remarks.....

SIZE.	MATERIAL.											
	Pipe.	Ells.	Street Ells.	Tees.	Crosses.	Nipples	Long Screws.	Caps.	Plugs.	Reducers.	Couplings.	Bushings
¾ in.												
1 in.												
1¼ in.												

Labor.

Name.	Hours.	At.	$

Total Cost of Labor.... ____

Total Cost of Material.. ____

.....*Foreman.* Total Cost of Service... ____

the latter were also posted in the "Meter Book," Form XIV. (not shown), which gave the history of each meter from purchase to condemnation. In a small company it is seldom necessary to assign a company number to a meter, the maker's serving equally well for identification.

In all records pertaining to meters or consumers, the "account" system shown in Form XIII., by which each consumer is known by a number, is of great value, and is used by many companies large and small. By a liberal allowance for future growth in allotting at the start many more numbers to each block than there are consumers, it will be at long intervals only that a re-allotment becomes advisable; and even then this does not involve in companies of the size we are considering a too onerous labor.

Though discounts were given for prompt payments, no provision for them is made in the consumers' ledger, the plan followed being to enter all bills at net rates, and then, in the case of those few persons who lost their discounts, to make a journal entry against them to the credit of "Discount." This method saved much work, and the objection to it that perhaps there might be omissions to add the discount and money be lost in this way, does not have much force in a small gas company, where things are on such a little scale that memory can be trusted.

The "Route Books" are not given here because of their extreme simplicity. The writer found in use one that contained merely the name, with no address nor meter number. In this vagueness the old employee gloried, because with such a system he was the only one that could find the meters. The addition of address and meter number made the books more generally useful. It is convenient to have many of these books, so that one or two are finished quickly each month, and the writing of bills can begin.

Form XV., "Inspection Report," was designed to record the results of an inspection at every house of all work between head of service and meter outlet. All meters were being brought in (some for the first time in 20 years) for testing and repair, but this would take a year, and

Form IX.

Stove Order No..... Service Order No. ..... No.....

STOVE DEPARTMENT.

.....GAS COMPANY.

.....189....

Name,.....

Address,.....

Stove,.....

SIZE.	MATERIAL.											
	Pipe.	Bushings.	Couplings.	Ells.	Nipples	Plugs.	Reducers.	Tees.	Unions.	Stop Cock.	Lead Pipe.	
⅜ in.												
½ in.												
¼ in.												

Labor.

Name.	Hours.	At	$

Total Cost of Labor....

Total Cost of Material..

Total Cost of Job.....

Finished.....189

Signed.....

Form X.

Ledger Charge.....

CHARGE TICKET.

.....GAS COMPANY.

.....189....

Material Used in.....For

Name,.....

Address,.....

	Quantity.	Size.	Cost.		Quantity	Size.	Cost.
Lead Pipe...				Lock Nuts ..			
Pipe.....				Nipples			
Pipe.....							
Pipe.....				Plugs			
Burners				Reducers....			
Bushings....				Meter Shelv's			
Caps.....				Solder			
Meter Cocks.				Tees			
Iron Cocks..							
Couplings ..				Unions			
Crosses.....					Hours.	Rate.	
Elbows				Fitter			
.....				Helper.....			
Hooks				Shop Time..			
Meter Keys .				... .			

.....Fitter.

Form XI.

.....GAS COMPANY.

No. Meter.....

Maker..... Size .....

Name.....

No.....St.

Set.....189..

Removed.....189..

State.....

Acc't No.....

Form XII.

METERS SET AND REMOVED.

Date.	Consumer.	Acct. No.	Meter. Kind and No.	State.	Set.	Removed.

besides, it was realized that the best way to get a report on the facts indicated was to send some one for that purpose only. Changes in stopcocks or connections, and meters when urgent, were made wherever these reports showed necessity. "Distance from Service to Meter" was put in chiefly to catch meters located in upper floors, which were done away with as much as possible.

Forms XVI., "Pressure Report," and XVII., "Burner Report," were used principally at houses which answered the reply postal card, Form XVIII. An interesting comment on human nature, or an indication that we had a weli lighted or easily satisfied set of consumers, is the fact that not more than 10 per cent. of the postals came back. Many must have thought there was a gas bill in the woodpile, and that it was impossible for a gas company to be sincere in offering to give more light for less money. So our attempts to bring light to dark places were largely blocked. If we had changed burners without asking permission there would have been serious trouble. Forms XVI. and XVII. were filed by account number. Form XVIII. explains itself.

Form XIX. is a convenient way of notifying people of what they generally expect to hear, though never believe, that their meter is correct. When the meter proved fast, a statement of the allowance to be made was shown, and the consumer asked to present the postal card when applying for it.

The "Time Card," Form XX., was used for convenience in getting upon the payroll the proper classification of all time of men whose work did not always go to the same account Whenever the separate costs of certain pieces of work were desired, job numbers were assigned and the relating time cards preserved.

Form XXI., known as a "Requisition," was filled out for the superintendent by the works' foreman or the clerk in charge of office and gas stove sales, and served as a memorandum for ordering articles by Form XXII., which was numbered serially, beginning at 1 each year, and copied in a separate book, the page of which corresponded to the order number. Indexing in the ordinary way made each order quickly available. This Form was invaluable in *bringing in* bills. The local custom was to render bills annually, or at still longer intervals if there was no need for the cash. An account due from a man with good credit was regarded as a balance at bank and not drawn on till needed. The writer received bills, presented for the first time, for work done three years previously. Therefore, it was something of an innovation to get a telephone message from the gas company, on the last day of each month, to "Be sure to send in your bill to-morrow," and the order book furnished the telephone list.

Form XXIII. shared with the gas bill the meed of unpopularity. In large companies it is sometimes customary to lead up to this shut-off notice by two preliminary ones, but we were not organized on so elaborate a scale. At one time the superintendent's name (as treasurer) was signed to this form, but this was dropped in order to make the notice as impersonal as possible.

The gas bill (Form XXIV.) can be improved on. The writer now prefers to state the actual date of each meter reading, to explain the cases where irregular intervals of reading have been unavoidable. It is strange the fatality with which, when one month's bill represents about 27 days' consumption, and the next bill 35 days, the consumer manages to burn in the last period an amount out of all proportion to what he realizes, and you have the story of "Didn't burn any more this month than last; but the bill is about twice as high." When the bill states on its face exactly the period it refers to, some of this discrepancy is explained. Also, the allowance of a discount period for a certain time after the bill is *presented*, is better than one fixed day for all consumers, especially where, as is the case in most small towns, bills are distributed by a collector instead of being mailed. The first people reached have a leeway of 14 days (when the fixed day is the 15), but the last may have only four. Of course, they know that this will be the case, but yet many always regard it as another wrong put upon them by the gas company. The variable discount day also avoids the congestion of business, that always occurs near and on the fixed discount day. It is much better to spread this business evenly over a week or more.

The remarks on the back of the bill vary with every company and

Form XIII. (1st Page.)

JUNE, 1898.						MAY, 1898.						APRIL, 1898.						MARCH, 1898.					
Meter Reading.	Consumption.	Amount of Bill.	Back Bill.	Amount Paid.	Folio.	Meter Reading.	Consumption.	Amount of Bill.	Back Bill.	Amount Paid.	Folio.	Meter Reading.	Consumption.	Amount of Bill.	Back Bill.	Amount Paid.	Folio.	Meter Reading.	Consumption.	Amount of Bill.	Back Bill.	Amount Paid.	Folio.

Form XIII. (2d Page.)

Account Number.	NAMES.	Street	No.	METERS					Meter Reading.	Consumption.	Amount of Bill.	Back Bill.	Amount Paid.	Folio.	Meter Reading.	Consumption.	Amount of Bill.	Back Bill.	Amount Paid.	Folio.
				Size.	Maker.	Number.	Date Set.	Date R'd.	OCTOBER, 1897.						NOVEMBER, 1897.					

Form XV.

.....Gas Company.

INSPECTION REPORT.

Name.....

No.....Street.

Account No..... Meter No.....

Condition.	Size.
Meter.....	.....
Connections.....	.....
Stopcock.....	.....
Service.....	.....

Distance from Service to Meter.....

No. of Meters on Service.....

Remarks.....

.....

.....

Form XVI.

.....Gas Company.

PRESSURE REPORT.

.....189....

Name.....

No.....Street.

Acc't No..... Condition of house pipes.....

Size main..... Size service..... Size meter.....light.

Pressure head of service.....

" .....

" .....

" .....

No. of burners in house.....

" ordinarily in use.....

Gas used.....years.

Remarks.....

.....

.....

Form XVII.

.....Gas Company.

BURNER REPORT.

Name.....

No.....Street.

Lava Tips.

Sizes.	1.	2.	3.	4.	5.	Total.
Took off....	.....	.....	.....	.....	.....	.....
Put on.....	.....	.....	.....	.....	.....	.....

Bray Burners.

Sizes.	1.	2.	3.	4.	5.	Total.
Took off....	.....	.....	.....	.....	.....	.....
Put on.....	.....	.....	.....	.....	.....	.....

..... *Pillars.*

Sizes.			Total.			Total.
Took off....	.....	.....	.....	.....	.....	.....
Put on.....	.....	.....	.....	.....	.....	.....

.....

Form XVIII.

.....189....

.....Gas Company,

.....

Gentlemen: Call at my house, No.....Street, at.....P.M., or.....P.M., to change the burners and test the pressure in the house pipes.

Yours truly, ...

Dear Sir: While Welsbach lights are cheaper for the consumer than the ordinary flat flame burners, and may in time entirely supersede them, yet to-day there are still many of these ordinary burners in use, and because of their age or bad construction, only a dim light is given, and the gas company is blamed for poor gas, while all the time the trouble is in the burner. Desiring to remedy this, we have bought some of the best burners, and while we cannot afford to place them all through the house, we can put in a limited number where you may designate, and replace the remainder of your burners by new brass pillars and lava tips if you so desire. It will cost you nothing and be to your advantage in increased light for the same money. Kindly fill out the reply card so that we may know when to call. We prefer to do the work when you are at home, and the evening hour will enable you to judge better of the size burner you like. To avoid the chance of our having another engagement, mention two times when we may come.

Yours truly,

.....Gas Company.

Form. XIX.

.....189..

.....

.....

....

Your meter has been tested, as per your request of..... and has been found.....

.....

.....

.....

Yours respectfully,

.....Gas Company.

Per.....

Form XX.

TIME CARD.

.....Gas Company.

.....189..

Name.....

Occupation.....

Work Done.	Where.	Time.
.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....
	Total,	.....

Job No.....

Job No.....

Job No.....

..... Foreman.

Form XXI.

$.....G. .....GAS COMPANY. .....189..

To the Superintendent:

Furnish me within.....the following articles:

Articles.	To be Used For.	Last Bought.
.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....

.....

Form XXII.

.....Streets.

No..... .....189....

.....

.....

Please furnish on account of this Company the following material. Send bill *numbered as above*, promptly to this office, or if bill is rendered monthly, send it in time to reach this office the last day of the month, and mark each item with the number of its order.

To be delivered to.....

on or before.....189....

.....

.....

.....GAS COMPANY.

Per.....

Superintendent.

Form XXIII.

Office of.....GAS COMPANY.

.....Street.

.....

Mr.....

Your account, amounting to $.....is past due

Please send this amount to this office by or before 12 o'clock noon .....next, the.....instant, or we will be obliged to discontinue the service. Respectfully,

.....GAS COMPANY.

Form XXIV.

Consumers will be held responsible for all gas passing through their meter until written notice of discontinuance is received by Company.

M._____ ACCOUNT No._____

_____

Dr GAS CO., Dr.

78 MAIN STREET.

_____189

GAS USED FOR LIGHT:

PRESENT STATE OF METER _____00

PREVIOUS " " " _____00

CONSUMPTION _____00 Cu. Ft. @ $1.70 PER M.

LESS DISCOUNT OF 50c. PER M.

GAS USED FOR FUEL:

PRESENT STATE OF METER _____00

PREVIOUS " " " _____00

CONSUMPTION _____00 Cu. Ft. @ $1.50 PER M.

LESS DISCOUNT OF 50c. PER M.

PAID_____189 _____ Total

TO SECURE DISCOUNT

Bills must be paid by the 15th of month,

Following that in which Gas was used.

Use GAS for COOKING and COKE for HEATING.

Say other things. Ask us about our Gas Stove rights.

All complaints promptly attended to. Notification should be given before 3 P. M.

Form XXV.

Account No.....

Premises.....

CONSUMERS' RECORD.

Service.	Meter.
	Illuminating. Fuel.
Order No.....	Set.....
Date Run.....	Size.....
Size.....	Co.'s No .....
Drips to.....	Maker's No.....
Tapped on.....	Removed.....
.....House Line No.	Cause.....
Cut off.....	

Remarks.....

Form XXVI.

No.....Street.

Name of Occupant.....

Owner or Tenant .....

Residence, store or what?.....

Number of rooms.....

Main on street? .....

Service in house?.....

House piped for gas?.....

Has occupant ever used gas? .....

Why was its use discontinued?.....

.....

Present mode of lighting.....

Reasons of occupant for not using gas.....

.....

.....

Remarks:.....

.....

.....

Signed.....

Date.....189....

their exact usefulness is unknown, but the space is there, the cost to fill it small and the result may be large.

The "Consumers' Record" card, Form XXV., affords instantly to the office clerk information often wanted when application is made for gas, and is of great value to the superintendent in a number of ways. The cards should be filed geographically, which, for a long while, would be the same as by account number.

This article as first written omitted all reference to a "Complaint Book," perhaps because the company in question bought a cheap blank book, ruled some lines in it and entered all complaints there at the rate perhaps of two or three a day. Therefore the matter was not of much importance. The writer's preference now would be for a card form filed geographically on which to enter the complaint and the report of the remedy. It is true this method is without the chronological order of the old complaint book, and there is some danger of a complaint being lost, but these defects are outweighed by the advantages of having all complaints from the same house filed side by side, and the consequent ease in detecting lack of thoroughness on the part of an employee. Following this card system throughout would mean that no orders for any kind of work would be written in a book, but put down on the appropriate forms (in our case Nos. 8, 9, 10, 11, 15, 16, 17) when received. This rule was followed by the writer, except for complaints as already mentioned. Using a serial number in connection with these forms would cause the loss of any one to be quickly detected.

Form XXV. was used in making a house-to-house canvass of every dwelling in the line of our mains not using gas for both light and fuel. As the cards came in they were arranged into various classes, and several times a year the most promising taken out and a second, third or fourth visit made. In this way a certain amount of new business was gained and everybody in town knew that the gas company existed. Incidentally, some people heard, apparently for the first time and very incredulously, that something besides coal could be used to cook food.

Any superintendent equipped with the stationery just shown will undoubtedly be able to make, distribute and sell gas. The simple forms on which he should figure up his profits are not given, though we may hope there are profits to be shown, and he is not in a town where the city fathers desire that he should be in business for his health only.

Experiences with the Incandescent Gas Light.[1]

By MR. NORTON H. HUMPHRYS, F.C.S.

The fact that the new pattern Welsbach burner is one of the most important discoveries of the age, in connection with the practical sale of gas, may appear at first sight to be so well known as to render repetition needless. Yet, like many other facts that are taken for granted as coming under the heading of everyday knowledge, it is not appreciated at its full value by the majority of gas consumers, by the majority of directors of gas companies, and, I may almost add, by the majority of gas works managers. Ordinary flat flame burners may be taken as capable of yielding an efficiency or duty equal to 3 standard candles per cubic foot of gas consumed per hour. The Argand will give something more; and by the adoption of costly, cumbersome, and unsightly

1. *Journal of Gas Lighting.*

regenerator appliances, this duty may be doubled or trebled. But the new pattern Welsbach which can be attached to any ordinary pendant or bracket with as much facility as a flat flame burner, will yield a duty equal to ten times that of the flat flame, or 30 candles per cubic foot. And yet many gas companies treat this remarkable fact with comparative indifference. What a different reception would surely have awaited an invention of equivalent value in almost any other branch of engineering!

Various explanations in excuse of this line of conduct may be forthcoming. Some do not like the methods of business adopted by the vendors of the burners, some fear that the mantles are too fragile, and that the difficulties in the matter of maintenance are insuperable; while others imagine that the largely reduced rate of consumption, as compared with other kinds of burners, may become unpleasantly prominent in the rental book, and express a preference for appliances that will use more and not less gas. The plan of appointing one agent in each district does not work well in practice, unless that agent is also directly interested in the sale of gas. The only benefit to an ordinary tradesman is the profit on the sale of appliances, together with some indirect advantage in the way of introducing general gasfitting business. It might be supposed that the value of the exclusive privilege would be sufficient to induce him to adopt special methods in the way of advertising, canvassing, or otherwise pushing sales and working the thing for as much as it is worth. But I do not think that this is realized in practice. As a general rule, the exclusive agent simply exhibits the samples and showcards in his window or over the counter; and waits for the customers to come in. The result is that the agent's business is principally among his own connection. Most people are accustomed to keep to their own particular plumber or gasfitter, and (with the exception of the clients of the exclusive agent) if they ask for incandescent burners he does not care to refer them to another tradesman, or to own that he cannot supply them. Therefore he enlarges on the defects of the system, and endeavors to substitute some other appliance from his stock. Parties who have already purchased and used the incandescent burner, meet with the same sort of reception when they inquire for new mantles. They do not want to go to the other end of the town to get a mantle, but call in at the nearest shop—with the results above indicated. While one tradesman only in a town is setting forth the advantages—and that in a perfunctory manner—the remainder are advertising, with a very much greater degree of energy, the disadvantages of the system. The consequence is that the breakage of mantles and chimneys is far more widely known and appreciated, than the steadiness and cheapness of the light. The exclusive agent system is a first rate means of advertising the drawbacks and deficiencies, and for giving the general public an exaggerated notion as to the cost of the upkeep of the system and other disadvantages; and I do not think it is too much to claim that exaggerated impressions of this sort do prevail. It has lately fallen to my lot to discuss the question of lighting the streets by means of the Welsbach system, with "all sorts and conditions of men;" and popular ideas as to the cost of upkeep are remarkable. The assertion that we expect to do with less than six mantles per annum per lamp is usually received with derision as a piece of extravagant trade romancing; and the general idea tends towards four or five times that number. With private lighting the same thing may be observed. State that the cost of mantles, etc., is much less than the saving of gas, and that the new system can be worked, upkeep included, at a considerable saving on the flat flame burner, and two consumers out of three will at once tell you that just the contrary is the fact.

This is not the only, or indeed the most important, defect of the exclusive agent system. If the agent is not interested in the sale of gas, he has no inducement to teach the customer the precautions necessary to ensure the proper working of the appliance; such as the need for periodical cleaning and blowing out, or for undertaking any responsibility in the way of maintenance. Many purchasers have obtained an incandescent burner, and possibly undertaken to "put it on" themselves, under the impression that it can be left to take care of itself for 10 or 12 years, as they are accustomed to do with flat flame burners. These customers get landed between two stools—the district agent and the gas company. The agent will not help them himself, and, with a dog in-the-manger like spirit, objects to the gas company or anyone else doing so. And the gas company, even if they have the inclination, have not recognized the need; and have no organization capable of dealing with such cases. Meanwhile, the incandescent burner is being rejected in many cases as too troublesome for ordinary house or business use; and each case goes to swell the ranks of those who talk about "30 mantles a year." The only effective way of checking this undesirable movement is the introduction of a system that should ensure the periodical inspection of the burners; their maintenance in a reasonably clean and unobstructed condition, and the prompt renewal of mantles *when necessary*, and not before. The only parties who can do this are those who are interested in the sale of gas. The district agent does not mind renewing mantles by the dozen, but does not think one or two worthy his attention. I have known instances where he has attended to this department with unnecessary liberality, with the result that the consumer soon begins to think that the incandescent is an expensive system.

It is true that there are a large number of accessories, such as draught screens, anti-vibrator devices, etc., many of which possess considerable value. But it is not always that the district agent takes sufficient interest in the matter to make himself acquainted with these articles, to a sufficient extent to be able to advise as to their use, or when they may be applied with advantage. Nor does he, as a rule, trouble much about the question of pressure, or know when a pressure regulator is needed or not. Consequently, the system has been tried and rejected as unsatisfactory, when a pressure regulator, or a draught screen, or an anti-vibrator would have secured a very different result. All this goes to show that, if the incandescent system is to be permanently established to a degree anything like that which is warranted by its merits, the parties who are interested in the sale of gas must take the question of maintenance in hand, and must train men to the special work. A knowledge of the capabilities of the accessories is very necessary, but it is in no sense a substitute for the maintenance scheme. It will not replace systematic attention and inspection.

Customers who take up the system for the first time, with no previous experience of it, should be made to understand that the results of the first few weeks working do not afford a fair criterion as a basis for calculating out the cost of upkeep and mantles per annum. As with other things, they must buy their experience; and at first several mantles will be broken through inexperienced or careless handling in connection with lighting, extinguishing and cleaning. This is always the experience in introducing the system for public lighting. During the first few weeks the consumption of mantles and chimneys is considerable; but as the lamplighters get used to the new arrangement, the thing settles down to a normal rate. If a case of frequent breakages is taken in hand by an experienced man, a large reduction is the invariable result. Inquiry shows that the consumption of mantles is very unevenly disposed. One lamp goes on without trouble from month to month; but with another one or two broken mantles per week is the regular experience. The usual finding is that the large consumption is confined to a comparative small number; and striking these out, the average is not excessive. Particular attention should be directed to the most troublesome culprits, and the draught screen, governor, or anti-vibrator affixed, as experience may indicate. These difficulties having been put right, the thing settles down on a normal basis; and the cost of upkeep proves to be much lower than the first experiences would lead one to expect. The experienced hand is useful in many departments—such as the retort house, the boiler house, etc.—and is able to secure working results that seemed simply impossible at first. And with no speciality is this peculiarity more marked than the one now under consideration. At first sight, it seems impossible for a gas company to carry on a maintenance scheme without loss, except by charging rates that are simply prohibitive; but the results during the last few months are so encouraging that I believe, as experience grows, the cost of maintenance will be so reduced as to enable it to be profitably undertaken at merely nominal rates.

One reason for the indifference on the part of the gas interests to which attention has been drawn, is a sort of lethargic condition which is engendered by a surfeit of full dividends. The attitude of the prosperous undertaking that has enjoyed this privilege for a number of years, is in marked contrast to that of the struggling concern that has to regard dividends as among the things of the future. But let the prospect of competition fall across its path—such as the adoption of an electric lighting scheme by the municipal authority of the district—and a rude awakening at once takes place. The fragile nature of the mantle is at once forgotten, the possible effect on the rental book is overlooked, and the word at once goes forth that something must be done. Competition of this sort is yet perhaps more the exception than the general rule. The exaggerated claims put forth by promoters of electricity supply companies have illustrated the possibility of this; and with the advance of scientific knowledge, it may be expected to increase and become more general. Surely it is better to move steadily into line with the general advancement that is the characteristic of the age, than to hang back for awhile and then rush up with a sudden

start. The rapid change of policy not only excites ridicule, but is likely to be attended with blunders and errors that are inseparable from inexperience, and which could have been avoided by a more accurate reading of the signs of the times. The Irishman's "one step forward and two backward" may be impossible in a strictly literal sense; but they are frequently aptly illustrated by mistakes that are made in connection with business enterprise. So some who at present repose luxuriously on the faith that the security of the past will extend indefinitely into the future may one day wake up to find themselves a long way to the rear, and possibly hopelessly behind in the race. Even where no sign of competition is at present evident, the peaceful times may be profitably utilized in getting into trim for the campaigns that may be expected in the future. Other agents are being extended and developed; and we cannot tell the dimensions they may eventually attain. Nor is there any means of indicating the prospects in store for gas, under the more energetic *regime* that will have to come. If gas had been advertised, canvassed, pushed and studied in every practical detail during the last ten years to the same extent as has been done with electricity, where should we stand to-day? To say that sales would be doubled, is to say the least.

But though very little has as yet been really accomplished, signs of a general rousing are not wanting. One cannot peruse the technical press of the gas industry without observing the prominent position accorded to all efforts in the way of extending business, and to new burners and accessories. Time was when all efforts appeared to be directed towards the saving of a penny per 1,000 cubic feet in the retort house, or a farthing per 1,000 cubic feet in the purifier house, to the exclusion of all topics relating to consumers and consumption of gas. The Salisbury Gas Company have lately entered upon an advancing policy; and if one may judge by the inquiries received, and the visits of inspection made by friends in the profession and by parties interested in improved lighting, the attention directed to movements of this nature is more widely spread than the facts above indicated would lead one to suppose. Therefore a few experiences from practical working, both in public and private lighting, may be acceptable to those who as yet have had but little to do with the incandescent system. In approaching the subject, it is important to remember that lighting by incandescence—which may be defined as the utilization of the heating rather than the illuminating properties of the gas—is at present quite in its infancy, if one may borrow a somewhat hackneyed phrase. It is only a creature of the last few years, as it cannot be said to have come into the bounds of practicability before that time; but notwithstanding the difficulties it has had to encounter, it now represents an important branch of consumption. From inquiries recently made, there is good reason to believe that a sufficient number of incandescent burners have been sold in Salisbury to represent more than one-fifth of the total number of flat-flame burners in use. Although the time when gas will be valued for its heating properties only is not yet within hailing distance, it is well in sight. Many other things are also still in their infancy; and not likely to advance beyond that interesting stage for a long while to come. But the incandescent gas light is not to be reckoned within this category. On the contrary, it is growing rapidly, and affords wide scope for immediate encouragement and development. The jump from 10 up to 30-candles efficiency, in a comparatively short time, warrants the expectation that the ultimate limit in this direction is yet a long way off. The progress as regards durability of mantles has been sufficiently marked to enable the same argument to apply; though perhaps to a less extent. As it is, the demand for incandescent appliances is of sufficient importance to act as a powerful incentive to the progress of invention. So no one need hang back for fear of being involved in a losing game. A member of the New England Association of Gas Engineers took up the topic of "Possibilities" at the recent meeting. Following his line of thought, one may ask: "What are the possibilities as regards the incandescent light? Is it unreasonable to hope for a mantle, as tough as a piece of paper, that can be retailed at about 3s. per dozen? Is a self-lighted contrivance beyond the range of possibilities?" Whatever the answer to these questions may be, the incandescent gas light has come to stay; and the efforts of all concerned in the sale of gas should therefore be directed to encouraging the demand for it in every possible way.

(To be Continued.)

[From *Journal of Electricity.*]

Railway Electrolysis Popularized.

Vague indeed are the ideas prevailing among the greater part of business men respecting the electric current. The action of this invisible agent, so dreadful in the thunderstorm, so grand and beautiful in electric lighting—reaching its culmination in the display of the aurora borealis—so powerful and obedient when used as a motive power, and so awe inspiring when some unfortunate lineman inadvertently places his hand on one of those small, ordinary looking copper wires and is instantly stretched out a corpse; there is little need for wonder that imperfect ideas should prevail, especially when those who know most about it have much yet to learn. The electric current is now proving so useful that we see some manifestation of it continually, and there appears to be no end to the uses to which it is being applied.

In its primary state it is energy in motion, the same as wind is air in motion. It may be of so faint a nature as to be outside of the reach of the most sensitive instruments that have been invented. From this vanishing point it has been found to be possible to amplify and energize the current to almost any extent. To illustrate: We take a quantity of water to a suitable pressure machine and we can put energy or power into it to almost an unlimited extent; this water has not changed its form, it is the same weight and has the same familiar appearance, but a few drops would as surely kill as the electric current. We lay small, strong steel pipes through the streets and take small pipes from them, and in the factories attach them to machines of any required size and duty; the water, after the power is extracted by the machines, runs off by the waste pipe harmlessly.

It is not as easy to procure a supply of the electric current as it is to procure a supply of water. The chief source of supply at the present time is the coal pile. As there is a demand for a large amount of the electric current, we obtain it by attaching a machine called a generator to a prime mover, and it readily supplies all that is needed. A small steam engine will furnish a small amount of current, and this amount increases with each increase of power.

A current of electricity flows from the generator, when actuated, the same as water flows from a pump when actuated by an engine for that purpose. But the current of electricity is of no value for power purposes unless there is power put into it. This corresponds precisely with elevating a quantity of water, which, in falling back to the earth, can be made to give up that power. To put water under pressure is the same as elevating it. So with electric current when power is put into it and it is sent forth to do work; it is then spoken of as having voltage. Thus we have currents of 1 or 2 or 500 volts pressure; this is the measure of the potential force. Low pressure currents are used in metallurgical works for depositing metals; for electric lighting, pressures of 100 or 200 volts are commonly used, and for driving street car motors a pressure of 500 volts generally prevails.

These currents are sent forth from the generator on a coppor wire. To conserve this energy until it reaches the place where it is to be used, and so earn money, it must not be permitted to leave the wire, which in railway work, is carefully insulated, or electrically isolated from the earth, because, if by any means it could reach the ground the voltage would instantly be absorbed by the earth and the power would vanish the same as if the faucet of the water power pipe or hydraulic main were opened wide. When the power has been entirely used the electric current has been rendered practically inert. The rate of flow of the electric current sent along the wires is measured by amperes, the same as we measure water by the miners' inch, and amperes of electric current are as capable of measurement (when passing through an instrument called an ampere meter or ammeter) as time can be measured by a clock. Thus we have a small current of 1 ampere or more used in metallurgy or telegraphy, or of 10 amperes for arc electric lighting, while street cars generally require an average current of 50 amperes. The amperes represent the current itself, and the volts show the strength or electric pressure exerted on the current. It is the amperes that do the work and they represent one factor of the cost of electrical energy; the volts represent the remaining factor.

But there is a very singular thing connected with the supply of the electricity, and this may be illustrated by returning to our hydraulic main. Imagine, if you can, that this great city is located in the desert of Sahara, or in some such place where water is remarkably scarce, in which event the company owning the electric power station would see to it that every drop of water used for power in the various machines, shops, elevators, etc., was returned to the works to be used again *ad infinitum*. The company could not afford to pump the water 10,000 feet from the bowels of the earth whenever it needed water, for it might thus take three times as much power to pump the water as to put power into the water when finally obtained. It is just so with the electric railway companies. The duly energized current is carefully conducted along the railroad line and from time to time the feeder is tapped to the trolley wire; thence it rushes to the motors driving the wheels. The volts put out by the generator are all consumed by the time the amperes have been forced back to the power house, and this consumption of voltage occurs in three ways: (1) in the trolley lines and feeders; (2) in

the motors; (3) in the track and earth return, but as the track is generally defective as a conductor of electricity, the amperes are absorbed by the earth in such a manner that before they have become spent they have time to work great mischief amongst water pipes, gas pipes and the structural iron of great buildings. These effects become more apparent when there is an insufficient path for the spent current to return to the power house. The current possesses an irresistible tendency to return to the power house from any point where it may be liberated from the servitude of driving motors or lights, but it is a fact that very little pains are frequently taken to insure its safe or proper return.

Many tramway people do not see these things in this way and they go on sacrificing their own well being and pumping the cities full of injurious and dangerous currents. The railroad authorities are shown clearly to be sacrificing money in not caring as much for the spent current as for the live current.

It is a well known fact that for the installation of machinery to operate any electric road, steam power must be applied equal to a pull for each horse power of 30 pounds per ton on a level grade. In locomotive engineering a pull of 8 pounds per ton on a level grade is the proper allowance for 1-horse power, showing that electric railway engineering is nearly four times more expensive than it ought to be. Moreover, the tracks on which electric cars are operated are superior in every respect to the steam roads.

The rails of electric roads can be made into fine conduits for the safe return of the subtle current, which will never leave a good channel, path, or conductor for a poor one. The earth is a bad conductor of current; iron is a good conductor; copper is better. From the power house the current is carried on large wires, the greater the number of amperes the greater the capacity or area required in the wire; the voltage does not require to be considered, but when the voltage increases, the insulation has to be made more perfect and secure. After attaining a distance of say 2 miles from the power house, wire of less diameter is used as about one-third of the current has generally been used on reaching this distance. After reaching the fourth mile the area of the feeder is again much reduced, and near the end of the route the trolley wire alone carries the last of the current. Ordinarily, the total area of copper wires leaving the power house on any one route is less than a rod of copper 1-inch in diameter. For a return path the area should be larger on the same principle that we make the exhaust pipe of the steam engine larger than the feed pipe. Iron is not as good a conductor as copper, the ratio being nearly 7 to 1. The weight of rails used on the electric railroads is generally over 70 pounds per yard; such a rail has an area of 7 square inches, which is fully equivalent, as a conductor of electricity, to a square inch of copper. The route has, say, four rails, hence it affords a pathway for current four times as large as that of the live wires from the power house at their greatest cross section. But, as the rails are in lengths of 30 feet and are joined together by bolted fish plates, this break in continuity is fatal to the passage of the current and must be bridged over. This is done by "bonding" or attaching copper wires, joining one rail electrically to another. The copper wire thus joining the rails together should be larger in area than the cross section of the feeders at that point.

Bonding has been found to be a most difficult problem, and on many lines the bonding is almost useless for many reasons. Then came the cast iron and welded joints which were loudly proclaimed to afford a perfect solution of the difficulty; but now, after incurring very great expense for these joints, they are found to be also defective and water pipes have still been greatly damaged in their neighborhood. The melted metal coming in contact with the cold metal acts as a mold, causing a skin to form upon the coating, offering great resistance to the passage of the current which wanders off seeking an easier path. It thus finds a water or gas pipe within a short distance and travels along it, leaving its mark at the lead joints, or elsewhere, and at times causing deposits inside the pipe. The actual damage done to iron pipes and structural iron may be described as a species of rottenness, the familiar metallic features becoming quite changed so that they may be easily cut away with a pocket knife.

The failure of the cast and welded joints to carry current in a satisfactory manner is much to be deplored, because they have given a great amount of solidity to the track, and also entirely obviated the movement of the joints in a vertical plane. They have also confirmed what engineers have well known—viz., that proper construction of the track would entirely obviate the necessity of making provision for expansion and contraction. Electrical engineers (so-called) are behind the age in still providing for expansion and contraction in their bonds when none is required. The present practice of casting and welding joints might easily be perfected so as to remedy the present defect. It simply requires for each joint five cents worth of copper in one or more pieces having together the same area as the feed wire carrying the live current from the power house, to be fixed to the steel rail ends in a workmanlike manner so that the area of the surface of the steel in contact shall be seven times the area of the copper. Then proceed with the casting or welding of the joint so that no copper shall be visible. This will furnish a path for the current superior to any in existence.

According to present appearances the greater part of the street railroad companies are doing practically nothing to remedy the evil which now exists in greater or less degree in every city in the Union. The water and gas companies are therefore showing signs of increasing uneasiness, and from their standpoint it is not difficult to foretell that, unless correctives are applied, the time is surely coming when many of the street car systems now enjoyed will be tied up by injunctions. This would be to the embarrassment of thousands who have built homes in the suburbs, as well as the ruin of those who have placed their funds in the securities of those companies.

In Dayton, Ohio, the city has a just claim against the Peoples Railroad Company for $100,000 for destruction of water and gas pipes on a partial investigation; and the mischief still goes on. The railroad companies of Brooklyn, N. Y., are now being sued in the courts for damages laid at $3,000,000, and 200 suits are likely to be added, with additional claims of $17,000,000.

Municipal boards are composed of business men chosen because of their business qualifications. Very few have had time or inclination to study the subject under consideration, but there is a way of looking at and dealing with the matter which may perhaps commend itself to such boards, and which requires no technical knowledge to understand. The proposition is to enact an ordinance which shall require every electric railroad company doing business within the city to furnish daily a statement under the official seal of the company of the amperes of current sent out over each and every route owned by the company, the readings to be taken from recording ammeters placed in the outgoing feeders at the switchboard of the power house and read each hour of the day or night during which the engines may be operated. The railroad company shall also cause wires to be attached to each rail of said route or routes when it shall reach its nearest or most suitable point near the power house, as well as to ground plates and each water or gas main adjacent, and cause said wires to be connected to similar recording ammeters in such manner as to measure hourly the number of amperes of electric current returning to said power house. Thus will be obtained a record at each hour of the day of the outgoing and returning currents, these records to be duly placed on file. If, from a consideration of the record, it should appear that there is no current returned by the rails or any rail, or ground plates, or if the conductivity of any rail or ground plates did not reach a specified percentage, then the railroad company should be directed to provide a remedy within a certain specified time, subject to such extension as may be considered proper.

Electric lighting companies should also be required to furnish daily statements regarding the outgoing and returning currents, and instruments used in measuring the currents and also the wire connecting the rails with the instruments, should be open for inspection at any time by any duly authorized city official.

Hirt's Gas Purifying Apparatus.

March 14, 1899, U.S. Letters Patent (No. 620,925) were granted to Mr. Louis J. Hirt, of Brookline, Mass., for an improvement in gas purifying apparatus. Using the words of the specification:

This invention relates to a purifying tower for illuminating and other gas, and has for its object to provide a simple, inexpensive and efficient apparatus for handling loose purifying material.

Figure 1 is a vertical section of a purifying apparatus embodying this invention, and Fig. 2 a detail in plan to be referred to.

Referring to the drawings, *A* represents a shell or casing of metal or other suitable material, which is preferably composed of oppositely tapering sections a a^1, the upper section a flaring from its top a^2 toward the lower section a^1, so that the substantially dry purifying material admitted into the purifier through suitable hoppers a^4 a^5 may descend without liability of becoming clogged or lodging on the sides of the said purifier. The shell or casing *A* has secured to its inner walls, in any suitable manner, a perforated horizontal partition wall or grate surface a^6, having slots or openings a^7 of any suitable or desired size, according to the nature of the purifying material used, the said partition or grate dividing the purifier tower into an upper chamber a^8 and a lower

chamber a^9. The upper chamber a^8 contains an agitator for the purifying material, which is preferably made as herein shown, and consists of a series of vertically extended, oblique arms a^{10}, fastened at suitable distances apart to a vertical shaft a^{12}, having bearings at its upper end in a boss or box a^{13}, secured to the under side of the top a^3 of the casing A, and having its lower end stepped in a suitable hanger or frame a^{14}, secured, as by rivets or bolts a^{15}, to the walls of the chamber a^9. The shaft a^{12} may be rotated by means of a worm b on a horizontally extended shaft b^1, engaging a worm gear b^2 on the shaft a^{12}, the said worm shaft having bearings in uprights b^3, attached to the hanger a^{14}, and in

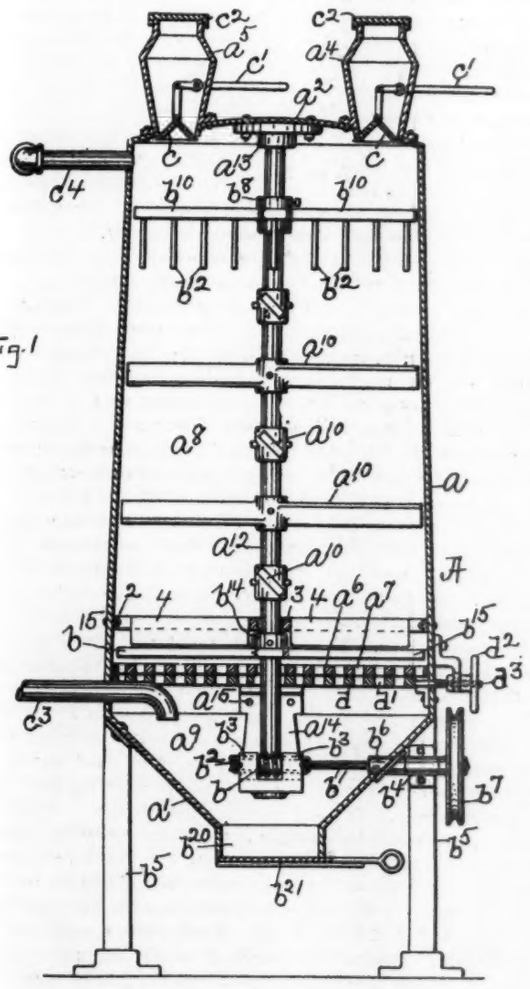


Fig. 1

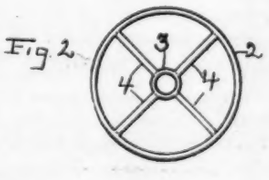


Fig. 2

a box b^4, attached to one of the supporting uprights or legs b^5 for the casing A, the said shaft being extended gas tight through a suitable stuffing box b^6 in the lower part of the casing A, and provided, as shown, with a driving pulley b^7. The vertical shaft a^{12}, near its upper end, has secured to it a hub or sleeve b^8, having extended from its radial arms b^{10}, provided with depending teeth b^{19}, and the said shaft, near the grate surface a^6, is provided with a collar b^{14}, having extended from it a series of radial arms b^{15}, which co-operate with a stationary frame attached to the casing A above the radial arms b^{15}, and have the functions of what may be termed a "breaker."

The stationary frame or breaker may and preferably will be made as herein shown, and consists of an outer ring 2, which is secured to the shell or casing A, an inner ring 3, encircling the vertical shaft a^{12}, and radial arms 4, which, as herein shown, extend close to the revolving arms b^{15}, so that in the rotation of the shaft a^{12} the arms b^{15} will carry the purifying material against the stationary arms 4 and serve to break up any large lumps or masses of the purifying material, and reduce the same to substantially a powdered condition, or to a sufficiently fine state to permit it to pass or be forced through the opening a^7 in the grate surface into the hopper shaped chamber a^4, from which the said purifying material may be discharged through the mouth b^{20}, normally closed by a slide or valve b^{21}. The hoppers a^4 a^5 are each provided with a valve c to close the outlet mouth of the hopper, which may be raised and lowered by a lever c^1, and each hopper is provided with a removable cap or valve c^2 for the inlet mouth of said hopper. The purifying tower has connected to it a gas inlet pipe c^3, extended, as shown, into the chamber a^9, and with a gas outlet pipe c^4, communicating with the chamber a^8, near its upper end.

In practice the chamber a^8 of the purifier is filled with substantially dry purifying material—such, for instance, as oxide of iron—and when substantially full the valves c are closed and the agitator set in motion. The teeth b^{19} serve to rake over and open up the top or freshest layer of purifying material, so as to expose the partially purified gas ascending through the material to the most energetic action of the purifying material just previous to the said gas leaving the purifier, to therefore remove traces of the impurities in the gas. The purifying material is continuously fed down toward the bottom of the chamber a^8 and becomes progressively saturated with the impurities absorbed by it from the gas, so that where it is forced through the openings a^7 in the grate surface or bottom a^6 it is saturated with impurities.

In order to regulate the size of the openings a^7 in the grate surface a^6 to the material used, the said grate surface has cooperating with it a like surface d, provided with openings d^1, and which is movable, as herein shown, by means of a handwheel d^2 on a screw-threaded rod d^3, attached to the movable grate surface d, which latter has the functions of a sliding valve to vary the size of the openings a^7.

The worm b and worm gear b^2 may in practice be covered with a suitable hood. (Not herein shown.)

The inventor claims—

1. In a gas purifying apparatus, the combination of the following instrumentalities, viz.: A tower provided with a transverse partition wall forming a chamber above and below it and provided with openings through which the material passes from the upper to the lower chamber, an agitator in the upper chamber, and a breaker for the purifying material cooperating with said agitator, substantially as described.

2. In a gas purifying apparatus the combination of the following instrumentalities, viz.: A tower provided with a transverse partition wall, forming a chamber above and below it, and provided with openings through which the material passes from the upper to the lower chamber, a revolving agitator in said upper chamber, and a stationary breaker co-operating with said agitator, substantially as described.

The Use of Electricity as a Motive Power in Modern Steel Works and Blast Furnaces.

[By Mr. A. E. Maccoun, in *Elec. World.*]

In the modern steel works of to-day, electricity as a motive power is gradually taking the place formerly occupied by the smaller class of engines which were used as auxiliaries around the mills. The numerous small engines which were used for operating cranes, rollers, saws, moving tables, charging and drawing machines and tilting ladles, such as at blast furnaces and converting mills, are gradually being replaced by the electric motor, and in some of the more modern mills the only steam machines in use are the main engines that operate the rolls, which are always of large power with automatic cutoffs and are thus fairly economical. In the changes from engines to motors around mills, there is a great gain in efficiency, as the type of engine formerly used on cranes, rollers, etc., was very uneconomical, not having any cutoff and using over 120 pounds of steam per horse power hour.

The motors are as a rule supplied from economical power stations which generate an electrical horse power under 20 pounds of steam per horse power hour, and even if the average efficiency of the ordinary series motor is only from 65 to 75 per cent. and shunt motors from 80 to 90 per cent., it is plainly seen what an enormous saving is effected by their use.

Then there are many other advantages in favor of motors. Long steam lines are done away with, and the losses due to the condensation in these is avoided; the motors do not require the constant attention the engines do—the constant packing of the piston rods, valve stems, etc.—and there is also a great saving in the amount of oil used. In many cases men required to run and attend to an engine were dispensed

with, as all the motor needs is to be started and one man can look after a great many.

Around the roll in mills there are also many other savings effected by the use of motors, as a great many controllers can be bunched together on one platform and one man can operate the same amount of machinery that required three or four with engines. And in nearly all cases where motors are introduced in place of engines, there is some saving of this kind effected together with the gain in efficiency.

Modern motors as a rule give very little trouble, and on intermittent work, such as on cranes, tables, rollers, etc., the standard street car motor is used, usually wound for 250 volts, as this is considered a safe voltage to use around mills, and motors of this type make a very substantial machine, both electrically and mechanically.

In other cases, such as for use on saws and shears or in places where constant speed is required, the multipolar shunt or compound motor is used, and as the bearings on these motors are self-oiling, the only attention they need is starting up, and machines of this kind run from one week's end to another. Many electric cranes are also used around steel plants, and nearly all material is lifted and handled by these, as it is by far the most economical method of handling all classes of material. When ingots are delivered from the converting mill to the rolling mill, cranes lift them off the trucks and lower them into soaking pits where they are heated and brought to a uniform temperature; then they lift them out of the pits and deliver them to the rolls. In some places over 1,200 tons of hot metal are handled in this way by 3 men in 12 hours.

After the metal is roughed down by the roughing rolls from an ingot to a bloom, sometimes better results are obtained from reheating before rolling into finished shape, and in that case the bloom is transferred by a small electric car which runs into a re-heating furnace, being pushed into the furnace by an electric charging buggy and drawn out after being reheated by an electric drawing machine, and then rolled to its finished shape.

Being finished it is usually the most economical method to load the finished product on cars for shipment by electric cranes or other devices, and in some cases when billets are made they run out from the mills after being sheared off to the proper length on conveyors operated by motors, and these drop them into cars for shipment.

In large blast furnace plants motors are now being introduced on hoists; some of these hoists on actual test use only one-fifth the steam that the hoisting engine required—obviously a very large saving. Engines for this use must stop exactly at the same spot, and as it is found impossible to use an engine with an automatic cut-off, they are regulated by throttling the exhaust steam, involving a steam consumption of about 150 pounds per horse power hour. In connection with large furnaces the motors used are about 120 or 150 horse power and lift 7 or 8 tons of material 250 feet per minute, and the hoists are entirely automatic after being started.

There are other places around furnaces where motors also play a very important part, such as running mixers and pig machines. The latter machine consists of an endless conveyor with moulds in the shape of an iron pig, and when the iron is not being used directly at the converting mill, it is run on this conveyor and cast into pigs. For scattered work around areas motors give by far the most economical results, and at some furnaces large electric cranes handle all the ore, coke and limestone and deliver it to the furnace hoist, resulting in a great saving in men.

The favor with which electric motors are being received in the class of work described is indicated by the fact that in some steel plants there are from 5,000 to 6,000-horse power of motors and the numbers are continually increasing. In addition to the power plant required to operate the motors, there are also, of course, large incandescent and arc light installations.

Consolidation and Prices.

Iron Age says that considerable loose writing is being done in the daily press relative to the effect upon prices of the numerous consolidations of iron and steel interests. These consolidations are indiscriminately denominated "trusts," and they are savagely scored for advancing unreasonably the prices of iron and steel products. Now it is a fact that in the entire list not one is of a character to bring it in the class of trusts. Here, for instance, is the Federal Steel Company, who are assumed by uninformed writers to be a great monopoly, overshadowing the American steel trade. The interests controlled by that Company represent only a part of the steel producing capacity of the country, the properties united under that corporation being only such as are quite closely related, and their amalgamation having been accomplished for the purpose of putting them as thus united in better position for enduring the severe competition for business in depressed times. The National Steel Company, another great steel corporation, were formed by the union of a number of plants located near one another and dealing with practically the same classes of consumers in the same territory. They also represent but a fraction of the steel producing capacity of the country, probably not one-fifth of it. The American Steel and Wire Company and the American Tin Plate Company come nearer to actual monopolies than any of the others, but both of them have some outside competition, and both of them were formed by the union of manufacturers who had passed through a harrowing period of destruction to capital by excessive competition for business. It is not necessary to go over the entire list to come to the point involved, which is that not one of them was organized for the purpose solely of advancing prices and squeezing the consumer. We have seen combinations of this kind in the past, all of them resulting in a worse condition of business than existed when the combination was formed. These new efforts to ameliorate the troubles of manufacturers are of a different character, aiming either to prevent the recurrence of ruinous prices by largely controlling production or to meet the necessity of low prices without loss of profit by controlling their own supplies of raw materials.

But it is asserted that the prices of wire nails, tin plate, steel billets and other products of consolidations have advanced so enormously that the high prices now ruling are absolute proof of the exercise of arbitrary power in that direction. Now let us examine some of the facts and see if this can be sustained. It will not be disputed that we have for some time witnessed a demand for iron and steel surpassing anything the world ever saw. The demand is not confined to one country, but comes from all parts of the globe. Its volume is so large that stocks of raw material and finished products have almost disappeared. Consumers may be said to be living from hand to mouth at the present time, not because they fear to buy, as was the case during the depression, but because they cannot get what they need fast enough. Reserve stocks have not only gone, but reserve producing capacity has also been drawn upon nearly to the available limit. What is the consequence? We see in lines in which consolidations have played no part advances in price even greater than in the lines presumably affected by consolidations. The manufacture of steel plates is entirely free from anything of this character, yet plates have advanced at Pittsburgh from 90 cents per 100 pounds to $2. Foundry pig iron is another commodity free from the effect of consolidations, but No. 2 Southern, which sold at $6.50 at the furnace or lower, has recently been sold at over $12. Other examples of the same character could be cited, showing conclusively that the rise in prices has been due to the fact that the demand exceeds the supply. Turning to wire nails, we find that carload lots at Pittsburg, which sold down to $1.25 per keg, are now bringing $2.05, which is by no means an advance to correspond with that on either steel plates or foundry pig iron, and in regard to tin plate $2.50 per box at works was an extremely low price on carload lots of 100 pound cokes, whereas they now bring $4 05 to $4 10, also showing but a comparatively moderate advance. The same comparisons might be made in other commodities, but these will suffice. In a court of justice a fair hearing is given even to a red-handed murderer. In the greater court of public opinion the same fair hearing should be given to men who are not criminals, but are safeguarding their interests. The consolidations have thus far shown no disposition to wring exorbitant profits from the people.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

OUR issue for the 10th inst. contained the statement that the capitalists who completed the reorganization of the Austin (Texas) Gas Light and Coal Company had retained Mr. E. L. Holmes as Superintendent. This seems to have been in error, for the official letter head of the Company carries the announcement that Mr. Carroll Collins is the Agent for the purchasers.

THE formal transfer of the plant and franchises of the Charlotte (N.C.) Company to the proprietors of the Charlotte Consolidated Construction Company has been made. The executive management of the latter is as appended: Directors, E. D. Latta, E. B. Springs, J. L. Chambers, F. B. McDowell and U. A. Bland; President, E. D. Latta; Vice-President, E. B. Springs; Secretary and Treasurer, J. L. Chambers. The work of main extension is being vigorously prosecuted.

THE United Gas Improvement Company has been awarded a contract by the Adrian (Mich.) Gas Company for the installation there of

a Lowe water gas apparatus of the Improvement Company's standard, double-superheater type. The capacity of the setting will be about 125,000 cubic feet per day. The contract also provides for the furnishing of a complete scrubbing and condensing equipment.

THE Clinton (Mass.) Gas Light Company's new office quarters in the Haskell Block will be greatly appreciated by its patrons, in that said quarters are right in the business center of the city.

THE proprietors of the Lowell (Mass.) Gas Light Company propose to extend the supply of gas to the outlying district of Chelmsford Center. The residents of Tyngsboro, Dracut and Billerica are also anxious for a similar service.

THE Western Gas Construction Company, of Fort Wayne, Ind., has been authorized to erect a complete installation of its improved Lowe, double-superheater water gas apparatus at the plant of the San Bernardino (Cal.) Electric Company. The contract declares that the apparatus shall be in working order by June 1st, which means that the Construction Company has 60 days in which to complete the agreement.

JUDGE MORTON, in the Supreme Court, Commonwealth of Massachusetts, early this month ordered writs of mandamus to issue on petitions brought by the Boston Elevated Railway Company and the Boston Gas Light Company against Superintendent of Streets Wells to compel him to issue to the petitioners permits upon their applications for leave to dig up the streets, for the purpose of making necessary repairs in their property in the streets, without charging them $1 for each permit. The Court holds that the respondent, who declined to consider their application, unless they paid $1 for each permit which was granted to them, has no legal right to charge the fee in the absence of any statute or ordinance giving him authority to charge such fee.

MR. M. S. GREENOUGH, President of the Cleveland (Ohio) Gas Light and Coke Company, has been elected President of the Cleveland Chamber of Commerce.

A CORRESPONDENT forwards the following: "The Fresno (Cal.) Gas and Electric Light Company, following its liberal policy, has concluded to further the use of gas ranges by causing them to be introduced on a broad gauge basis. The Company offers to place in any kitchen one of the latest improved gas ranges, making no charge for the pipe connection, and allowing the user 30 days in which to make a trial of the range as to utility and economy. If at the expiration of the trial period the user desires to go on the Company will sell the stove for cash, at a discount of 10 per cent. from its cost to the Company, or will rent it at the rate of $1 per month. When the monthly rental amounts to the cost price of the range the Company gives a bill of sale of the same to the user."

AT the annual meeting of the Rome (N. Y.) Gas Light Company the following Directors were chosen: Edward Comstock, John G. Bissell, Thomas H. Stryker, Wm. R. Huntington, Jno. D. McMahon, and Fred. M. Shelley.

AT the recent municipal election in Rockford, Ills., the following novel proposition was submitted to the residents by the Rockford Gas Light and Coke Company: "To the person who will send to the office of the Company the nearest guess as to the majority the successful candidate for Mayor will receive, the Company will give a new gas range, made in Rockford, and listed at $21.50. The offer is open to everyone in Rockford, the only conditions being that but one guess will be accepted from any person, that the guesser must sign name and address, and that the guess must be in the office of the Company by noon of Monday, April 17th.

THE United Gas Improvement Company has been awarded the contract by the Philadelphia Suburban Gas Company for the installation of a standard double superheater Lowe water gas apparatus, of a daily capacity of about 400,000 cubic feet. The apparatus is a part of the new plant that is being erected for the purpose of supplying the suburban district just south of Philadelphia, which plant when completed will be one of the most modern and efficient gas works in the country.

THE following resolution is being considered by the authorities of Richmond, Va.:

"*Resolved*, by the Council of the city of Richmond, that the price of gas for use as fuel or power shall be 75 cents per 1,000 cubic feet; provided the system of piping for the purpose in all houses shall be independent from that of illumination."

THE Peoples Gas and Electric Company, of Galesburg, Ills., has been incorporated by Messrs. J. T. McKnight, G. D. Crocker, S. Frolich, Samuel Swanson, C. C. Craig and A. W. Berggren. It is capitalized in $100,000, and it is proposed to operate in opposition to the existing Galesburg Electric Light and Gas Company.

THE J. N. Coldren and F. W. Booth interests in the Iowa City (Ia.) Gas Light Company—which interests stand for $34,000 out of the total capital of $50,000—have been purchased by R. N. Carson, of Philadelphia, and his brother, T. C. Carson, of Iowa City. The plant is to be remodeled.

THE Washington (D. C.) *Star*, of the 17th inst., says: "It is understood that a circular is being prepared which will be sent to the stockholders of the Washington Gas Company, stating that an offer has been made for the purchase of as much as may be offered of the stock of the Company, and requesting that the stockholders give notice of their willingness to sell. It is not known exactly what has been offered for the stock, but it is understood that $60 per share is the price determined upon between the prospective purchasers and the stockholders holding a control of the stock. Some disposition, however, it is thought, has been made of the surplus, but whether that will be represented in the price paid for the stock, as was done in the sale of the Metropolitan and Columbia Street Railways, or whether there is to be a distribution of the surplus through the medium of an extra dividend has not, it is said, been fully determined. A fact of some significance in this connection, and one which created a good deal of comment in financial circles today, was the notice that the books for the transfer of stock, which were to have been closed Saturday, would not be closed, which, it is said, has never before happened in the history of the Company. Heretofore, it is stated, when the time came around for the payment of the dividend, the books have been closed at a regular date without fail. It is inferred from this change that the question of the amount of dividend to be declared has not been determined. In other words, those who are conducting the deal for the sale of the Company are not decided whether to have an extra dividend or whether the amount that would be distributed by such a dividend be added to the purchase price of the stock. It is said that Mr. John C. Bullitt, of Philadelphia, a Director of the Company, and one who represents what are known as the Philadelphia interests, has taken an active part in the negotiations which have resulted in an understanding to sell with those owning a control in the stock. It is the supposition that he is identified with the same interests represented by Mr. Frederick C. Stevens, and it has been thought all along that Mr. Stevens was the prospective purchaser of the Company, and that it is the purpose to operate all the lighting concerns of the city under one management."

THE proprietors of the Nashville (Tenn.) Gas Light Company have determined to hold the field against all comers, whether the latter are of the opposition sort or not, as the following notice issued last Monday will show: "The Nashville Gas Light Company announces to the people of Nashville that, beginning the 1st day of May, 1899, it will sell both fuel and illuminating gas at $1 net; that is to say, the gas will be sold for $1.10 per 1,000 cubic feet, with a rebate of 10 cents per 1,000 cubic feet, if bills are paid within the first five days of each month; and it will sell the city of Nashville gas for public purposes, in accordance with its contract, at 50 cents per 1,000 cubic feet."

IN addition to the above, the Company declares its willingness to make all connections between its street mains and the house pipes of consumers without charge therefor.

THE Berlin Iron Bridge Company, of East Berlin, Conn., has been awarded the contract for the new roof for the "East Armory" of the Colts' Fire Arms Manufacturing Company, Hartford. This roof, which is 60 feet wide and 500 feet long, is to be entirely recovered. The roofing is to be of the Berlin Iron Bridge Company's patent anti-condensation fireproof roof lining, consisting of anti-condensation lining underneath the external covering of corrugated iron.

WE are in receipt of a characteristic letter from "Gus." Littleton, whose message was forwarded from Rome, Italy, under date of the 3d inst. Evidently he is enjoying his trip abroad, which will not terminate for some time. We are not sure whether we violate a confidence in this disclosure, but any of the fraternity who desire to communicate with the sojourner in foreign lands can surely reach him by addressing him, care of the London City and Midland Bank, London, England.

THE Derby (Conn.) Gas Company has recently placed its second order with the United Gas Improvement Company for the installation of one of the latter's forms of standard, double superheater Lowe water gas apparatus, up to a daily capacity of 750,000 cubic feet. This order shows most pointedly the great increase that is going on in the Derby Company's business.

MR. JOHN J. REA, for many years a trusted employee of the Baltimore Consolidated Gas Company, died at his home in that city the morning of the 16th inst. Deceased was born in Baltimore in 1857.

SUPERINTENDENT J. M. ANDREWS, of the Galion (Ohio) Gas Light Company, has his time pretty well occupied just now directing many important plant betterments. Perhaps the most notable of these is a double-lift holder, having a diameter of 54 feet 6 inches. The diameter of the height of each lift is 32 feet.

WE understand that the terms for the absorption of the East Albany (N. Y.) Gas Company by the Kinderhook Light and Power Company have been agreed to.

SUPERINTENDENT POWER, of the Cumberland (Md.) Gas Light Company has successfully completed a series of demonstration lectures on cooking by gas, the lecturess being Mrs. Helen Armstrong, of Chicago. The lectures were held during the afternoon (2:30 P.M.) of each day of last week, 4 of the series having been delivered in the Academy of Music, the others in Roberts' Hall. The lectures were well attended, and the interest in the excellent work done by Mrs. Armstrong was manifest. A feature of the course was the giving away of a handsome gas range to the holder of the lucky ticket—admission to the lectures was by ticket, carrying coupon bearing control number.

THE proprietors of the Doylestown (Pa.) Gas Company, after several years' experience with one of the many forms of oil-water air processes, have decided to change the generating system. The contract for the reconstruction has been awarded to the United Gas Improvement Company, which will erect one of its small sets of standard Lowe water gas apparatus, rated to a daily output of 50,000 cubic feet. This type of apparatus is of the description usually installed in works with small output, in which naturally the cost of improvement is of great moment.

THE total number of gas meters in use in the State of Massachusetts for the year ended June 30, 1898, was 183,949, representing a nominal capacity of 1,149,324 lights, being an increase over the previous year of 9,726 meters and 41,591 lights.

MR. T. S. GARDNER is herewith informed that the names of the incorporators of the Oakland (Cal.) Equitable Gas Company are: Wm. J. Dingee, Alameda, Cal.; Wm. G. Henshaw, Oakland, Cal.; Wm. J. Landers, San Leandro, Cal.; J. W. Chisholm, Chicago, Ills.; C. L. Ackerman, San Francisco, Cal.

DR. P. E. DOOLITTLE, of Toronto, Ont., has applied to the authorities of Rossland, British Columbia, for the right to there operate a gas works. A fairly good gas coal is obtainable in the Rossland district. We understand that Mr. Pearson, of Toronto, is working with Doolittle for this franchise, and if that is so it is likely that actual business is meant.

ANOTHER Company was anxious to have a try in the Nashville gas field—we use "was" instead of "is," for the reason that its original anxiety manifested itself prior to the announcement of the old Nashville Company's new selling schedule. However the title of the newcomer is that of the Union Gas Company; its incorporators are E. C. Lewis, T. J. Felder, A. H. Robinson, C. C. Christopher and W. L. Granbery, and it is capitalized in $500,000.

THE backers of the proposed opposition for Denver, Col.—the Mutual Gas Company—are now engaged in the attempt to secure capital for keeping alive this peculiarly birthed concern. It seems that it might be a difficult task, for under the franchise the Company may not charge to exceed 85 cents per 1,000 cubic feet for an illuminating supply, and 50 cents for a supply on fuel account; but where a customer uses gas on both the accounts named the charge for both may not exceed 65 cents per 1,000. And every gas man knows that these are extremely low gas rates for a city situated as is Denver with reference to costs of coal and oil, etc.

Chemistry as an Aid in Building.

The London *Builder* says that when the dark halo of mystery which surrounded the mediæval alchemists gradually dissolved under the influence of the flickering rays of a new light, and the weird and secret operations which our fathers performed in their vain search for the philosopher's stone and the elixir of life became superseded by less fantastic but more useful experiments to discover, by open and systematic research, the nature and properties of the most familiar forms of matter, then was laid the true foundation of that chemical science to which the present generation is so greatly indebted.

Since the expanding force of our teeming centers of civilization is irresistible, and Nature's scenic beauty is being thrust ever farther and farther from our homes, architecture in its highest form must daily become of greater national importance as the most powerful reactive against the depressing and demoralizing influence of "speculative-builder" architecture; a type of architecture which, in spite of its dreary monotony, is, unfortunately, extensively adopted in our great metropolis.

That base surroundings tend to create ignoble minds is a generally admitted fact, and it is evident, therefore, that the general beauty or repulsiveness of a town is a matter of vital importance to its whole community. In most British towns the architectural standard of business and municipal premises has risen during the last quarter of a century in a very encouraging manner, but these same towns still harbor their poorest denizens in quarters which, in their appalling sordidness, are apt to quench the final sparks of human nobleness, whilst they nurture the more fortunate thousands in streets of buildings remarkable only for lack of originality in design.

A noble edifice is one of the most valuable legacies that man can leave to future generations, yet the grandest product of the designer's hand and brain may be rendered of but passing value through inattention to those practical details of construction with which chemistry is concerned. Had more attention been given to the chemical effect of the atmosphere of London upon the stone actually employed in building the Houses of Parliament, it is probable that only the most durable stone from the quarry would have been used; the strenuous efforts of expert men of science to devise or select a satisfactory process for preserving the imposing pile from premature decay would have been unnecessary, and the valuable Report of the Royal Commissioners on the selection of stone would have produced a more satisfactory result.

The "weathering" of stones is, however, but one of the great number of subjects connected with building with which chemistry is intimately associated. "Dry rot" and "wet rot" in timber, the corrosion of metals, the "setting" of cements, the drying of oil paints and varnishes, the discoloration of certain pigments, and the effects of air and water upon quicklime are all, more or less, the results of chemical reaction. Combustion, moreover, is essentially a chemical process, yet it is the main factor to be considered in designing heating and ventilating arrangements.

Artificial building materials, particularly those of a fireproof character, are becoming every year more extensively employed; the production of many of these is dependent upon comparatively recent chemical discoveries, and many owe their commercial success to a large extent to the extraordinary reduction in the price of chemical products which has taken place during the last 20 years. Fireproof coverings for walls and ceilings, and timber made fireproof by chemical treatment, are rapidly increasing in popular favor, while artificial stone has long been a valuable article of commerce. It is too early yet to attempt to ascribe their true permanent value to many of these materials, but the increasing rate of their production is an indication that chemical science is likely to be applied more extensively in the future for the manufacture of building materials than it has been in past years; and, as man's scientific knowledge becomes more advanced, it is possible that very radical changes may be made in the size, shape and composition of the materials employed in the erection of buildings. Already we have witnessed the common adoption of iron for girders and other purposes, and although brick and stone are unsurpassed as building materials for permanent structures, there is a growing tendency in the construction of business premises and dwellings to sacrifice durability for lessened cost and increased speed of erection; and the diminishing power or will of the average builder's operative to perform satisfactory work is likely to result in an increased use of those artificial products which can rapidly be applied by the square yard by any unskilled lad.

One cannot but feel some regret that world now moves so fast that the business premises of the father are incapable of being adapted to the requirements of the son; with the result that many strong and interesting buildings are rased to the ground to make way for others more suited to the business necessities of the age. Some three months ago it was announced in the *Builder* that the old Post Office—that massive building on the east side of St. Martin's-le-Grand—is to be pulled down to make way for a new building better suited for the present business of the Post Office. Yet this classic edifice was built as

(*Continued on page* 615.)

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

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ELBERT P. CALLENDER,
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CHAS. E. SANDERSON,
MANAGER.

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MONDAY, APRIL 24, 1899.

(*Continued from page* 614.)

recently as 1825–1829. If, however, we accept the inevitable, and recognise that the cities of the future will be largely composed of buildings of more soul inspiring design and more imposing dimensions, but of less massive and durable construction than were the cities of the past, it becomes evident that materials made by the aid of chemistry and the kindred sciences will be in great demand during the next century. But while we foresee a general advance in the architectural standard of the average erection of the future, a question which must remain unanswered is: Will the noblest erections of the future advance beyond the best of those which have come down to us from the past?

In conclusion, mention must be made of one other subject with which chemistry is concerned, and which has not hitherto received sufficient attention from buildings in general, viz., the adulteration of building materials. If samples were collected and examined of all the building materials on sale in London at the present time, some surprising results would be obtained. Linseed oil is largely adulterated with mineral and resin oils, fish oil and cotton seed oil. White lead frequently consists mainly of barium sulphate or of chalk, but sulphate of lime and sulphate of lead also enter occasionally into its composition, while a certain amount of clay has also been disposed of under this appellation.

Vast quantities of barium sulphate are also sold in the form of paint, but mostly under fancy names at fancy prices. Colored pigments are notoriously the subject of gross adulteration, and "turps" and methylated spirit are not always above suspicion. A sample of cement or mortar taken from the works and subjected to analysis will oft result in strange revelations, while analyses of metal fittings are not always uninteresting.

But enough has been written to demonstrate that a knowledge of chemistry may be of considerable practical value to the builder and practising architect, and that the influence of chemical science upon building will probably increase appreciably in the immediate future. Chemistry must, of course, always hold a secondary place in the studies of the architectural student; but an elementary knowledge of its laws, and a little practical acquaintance with the common elements and their compounds, is undoubtedly desirable; and contractors would often be obliged to build with better-class material if architects more frequently seized samples for chemical analysis.

The Market for Gas Securities.

The main feature of the city gas share market last week was the gradual moving of Consolidated quotations to a higher point. The opening to-day (Friday) was made at 201, and all the Crokers seem to agree that gas affairs at Albany have gone beyond the point of senatorial control, for the current season at least. Those who should know assert that the combination of the lighting interests of New York will be made next month; that is, the shareholders in the various gas and electric interests will be given in May an opportunity to decide whether or not the terms offered them for their securities are sufficient. In our contention respecting this contest we have always been steadfast in asserting that the tail would not wag the dog, and our belief now as ever is that Consolidated is the dog. The outlook, apart from any speculative consideration, is that the quoted rates for any of the local gas shares are low, because the settlement of the dispute, which has been argued since September, 1897, is at hand.

Out of-town gas shares are generally quoted at better figures than those of a week ago. The feature of the Broad street curb exchange in the trading in gas stocks was the remarkable vivacity shown by Bay State, which went "over 5," but did not keep up. Detroit gas shows good strength, as does Milwaukee. Baltimore Consolidated is dull, at 68 to 69. Good advisers say that U. G. I. is cheap at 348, and in that thought we share.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.
16 WALL STREET, NEW YORK CITY.

April 24.

☞ All communications will receive particular attention
☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$39,078,000	100	201	201½
Central Union, Bonds, 5's	3,000,000	1,000	107½	108½
Equitable Bonds, 6's	1,000,000	1,000	105	..
" 1st Con. 5's	2,300,000	1,000	114	.
Metropolitan Bonds	658,000	..	108	112
Mutual	3,500,000	100	300	310
" Bonds	1,500,000	1,000	100	102
Municipal Bonds	750,000	.	..	.
New Amsterdam Gas Co.	13,000,000	100	37	38
Preferred	10,000,000	100	66	67
Bonds, 5's	11,000,000	1,000	103¼	104
Northern Union, Bonds, 5's	1,250,000	1,000	94½	95½
New York and East River				
Bonds 1st 5's	3,500,000	1,000	111	113
" 1st Con. 5's	1,500,000	..	107½	108½
Richmond Co., S. I.	348,650	50	70	..
" Bonds	100,000	1,000	..	..
Standard	5,000,000	100	132	138
Preferred	5,000,000	100	145	150
Bonds, 1st Mortgage, 5's	1,500,000	1,000	112	114
Yonkers	299,65	500	130	..
Out-of-Town Companies.				
Brooklyn Union	15,000,000	100	150	155
" " Bonds (5's)	15 000,000	1,000	118	.
Bay State	50,000,000	50	4	4½
" Income Bonds	2,000,000	1,000	..	75
Binghamton Gas Works	450,000	100	..	..
" 1st Mtg. 5's	450,000	1,000	..	.
Boston United Gas Co.—				
1s Series S. F. Trust	7,000,000	1,000	92	..
2d " " "	3,000,000	1,000	..	0
Buffalo City Gas Co.	5,500,000	100	13	14
" " Bonds, 5's	5,250,000	1,000	93	93½
Central, San Francisco	2,000,000	..	105	..
Chicago Gas Co. Guaranteed Gold Bonds	7,650,000	1,000	104	104¼
Columbus	1,144,700	100	70	75
1st Mortgage	1,207,000	1,000	101	103½
Consumers. Jersey City	2,000,000	100	88	..
" Bonds	600,090	1,000	104	106
Cincinnati G. & C. Co.	8,500,000	100	209	210
Consumers, Toronto	1,700,000	50	230	235
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000	..	..
Consolidated, Baltimore	11,000,000	100	68	69
Mortgage, 6's	3,600,000	..	107	107½
Chesapeake, 1st 6's	1,000,000	..	..	..
Equitable, 1st 6's	910,000	..	..	..
Consolidated, 1st 5's	1,490 000	..	..	..
Consolidated Gas Co. of N.J.	1,000,000	100	15	17
" Con. Mtg. 5's	380,000	1,000	80	82
Consolidated G. & E. Co.'s, Little Falls, N.Y.	90,000	100	..	100
Bonds	75,000	..	..	100
Detroit City Gas Co.	4,560,000	50	65	65½
" Prior Lien 5's	4,546,000	1,000	94¼	94½
Detroit Gas Co., 5's	423,000	1,000	95½	96
" Inc. 5's	31,000	100	..	..
quitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Fort Wayne	2,000,000	..	68	70
" Bonds	2,000,000	..	80	82
Grand Rapids Gas Lt. Co.	1,000,000	50	..	..
" 1st Mtg. 5's	1,125,000	1,000	..	..
Hartford	750,000	25	..	145
Indianapolis	2,000,000	..	100	105
" Bonds, 6's	2 650,000	..	105	106
Jackson Gas Co	250,000	50	..	..
" 1st Mtg. 5's	250,000	1,000	..	..
Jersey City	750,000	20	225	275
Lafayette Gas Co., Ind.	1,000,000	100	68	70
Bonds	1,000,000	1,000	81	86
Louisville	2,570,000	50	106	108
Laclede, St. Louis	7,500,000	100	54	55
Preferred	2,500,000	100	93	100
Bonds	10,000,000	1,000	107	108
Madison Gas & Elec. Co.	400,000	100	..	..
" 1st Mtg. 6's	350,000	1,000	..	..
Montreal, Canada	2,000,000	100	200	..
Newark, N. J., Gas Co.	1,000,000	..	200	220
Bonds, 6's	4,000,000	..	128	130x
New Haven	1,000,000	25	280	300
Nashville Gas Lt. Co.	1,000,000	50	110	..
Oakland, Cal.	2,000,000	..	53½	55
" Bonds	750,000	..	..	..
Peoples G. L. & Coke Co., of Chicago	25,000,000	100	126¾	127
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,00	1,000	111½	112
2d "	2,500,000	1,000	104	105
Peoples, Jersey City	500,000	50	240	250
Rochester Gas & Elec. Co.	2,150,000	50	52	..
Preferred	2,150,000	50	106	..
Consolidated 5's	2,000,000	..	87½	90
San Francisco, Cal.	10,000,000	100	75	76
St. Paul Gas Light Co.	1,500,000	100	50	52
1st Mortgage 6's	650,000	1,000	82	85
Extension, 6's	600,000	1,000	..	..
General Mortgage, 5's	2,428,000	1,000	80	83
St. Joseph Gas Co	1,000,000	100	..	..
" 1st Mtg. 5's	750,000	1,000	..	..
Syracuse, N. Y.	1,750,000	100	16	19
Bonds	1,612 000	1,000	85	89
Washington, D. C	2,000,000	20	260	265
First mortgage 6's	600,000	..	..	..
Western, Milwaukee	4,000,000	100	97	97¾
Bonds, 5's	3,389,500	.	106	108
Wilmington, Del.	500,000	.	208	..

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LAVA GAS TIPS.

D. M. Steward Mfg. Co., Chattanooga, Tenn.	620

STREET LAMPS.

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Thos. T. W. Miner, New York City	619

PURIFYING MATERIALS.

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van Baarda & Co., Dusseldorf-on-the-Rhine	629

VALVES.

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Chapman Valve Manufacturing Co., Boston, Mass.	620
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Continental Iron Works, Brooklyn, N. Y.	634
The P. H. & F. M. Roots Co., Connersville, Ind.	623
Isbell-Porter Co., New York City	634
The Western Gas Construction Co., Fort Wayne Ind.	640

EXHAUSTERS.

The P. H. & F. M. Roots Co., Connersville, Ind.	623
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Connelly Iron Sponge and Governor Co., New York City	629

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Wm. Henry White, New York City	635

GAS ENGINES.

Backus Water Motor Co., Newark, N. J.	578

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The Hazelton Boiler Company, New York City	619

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John Cabot, New York City	620

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American Meter Co., New York and Philadelphia	625
Maryland Meter and Manufacturing Co., Baltimore, Md.	638
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Gas Engineer's Pocket-Book	637
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Stockholders' Meeting.

OFFICE OF THE UNITED GAS IMPROVEMENT CO., DREXEL BUILDING, PHILA., PA., April 19, 1899.

The Annual Meeting of the Stockholders of the United Gas Improvement Company, will be held at the Company's new building, N.W. CORNER OF BROAD AND ARCH STS., PHILADELPHIA, Monday, May 1, 1899, at 12 o'clock noon, when an election will be held for a President and six (6) Directors, to serve for the ensuing year, and such other business transacted as may be brought before the meeting.

The stock transfer books will be closed from 3 P.M. Tuesday, April 25, until 10 A.M. Tuesday, May 2.

1246-1 EDWARD C. LEE, Secretary.

Position Wanted

As Superintendent or Assistant, or Manager of Gas Works,

By a young man. Number of years experience in all departments of the gas business. Am not afraid of work.

1246-1 Address "J. L. S.," care this Journal.

POSITION WANTED

As Assistant Superintendent.

Ample experience, pushing, and good gas seller.

Address "H. F. S.,"
1246-1 care this Journal.

Position Wanted

As Manager or Assistant Manager of Coal Gas Works,

by a man with 15 years' experience, from retort house to consumer. Address

1244-4 "K. C.," care this Journal.

Position Wanted.

On account of changes made in my present Company, I will ever my connection therewith on February 20, and solicit orrespondence with Gas Companies contemplating a change of management. Eight years with present Company. References. E. G. HOLZER, Supt. Gas Dept.,
1238-tf Roanoke Gas and Water Co., Roanoke, Va.

WANTED,

A Reliable Agent for a First-Class Dutch Bog Ore

containing 80 to 85 per cent. hydrated oxide of iron. Address
1245-2 "BOG ORE," care this Journal.

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would like to correspond with some Company contemplating change of management. Full particulars and references upon communication. Address
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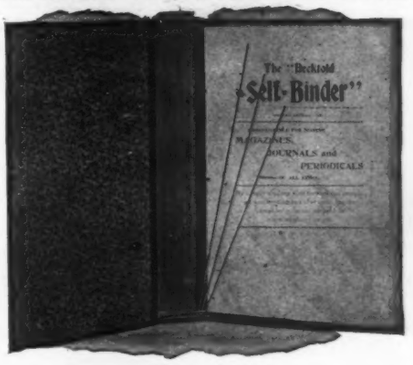

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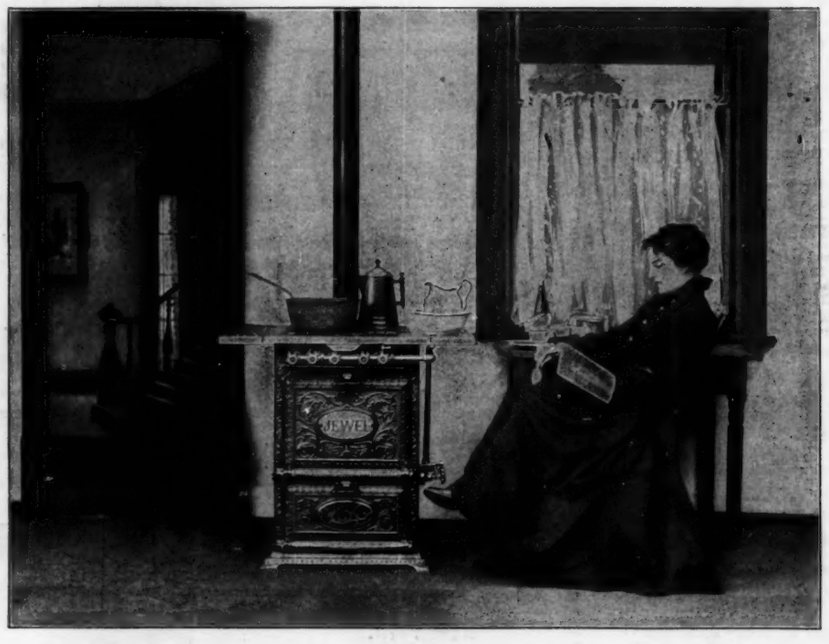

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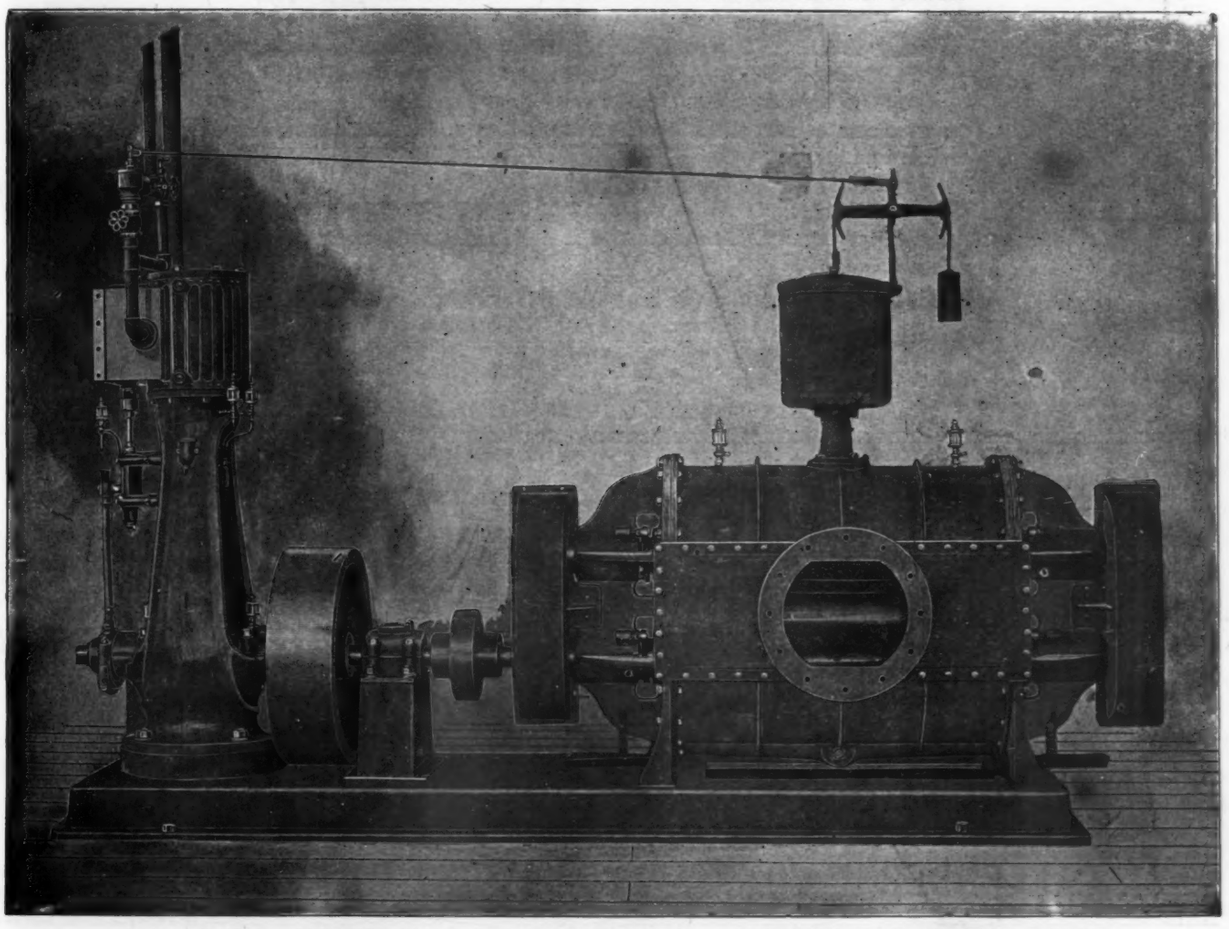

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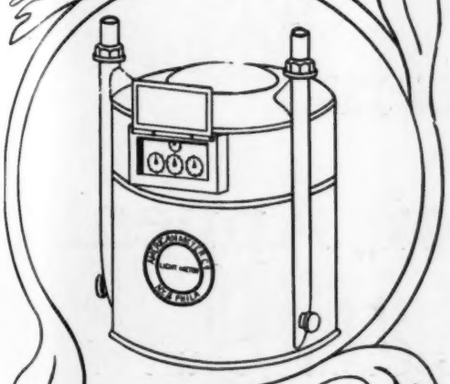
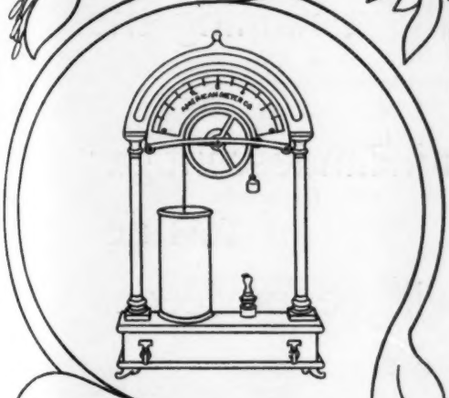
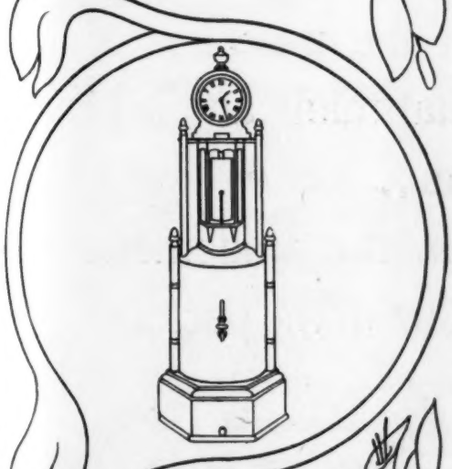
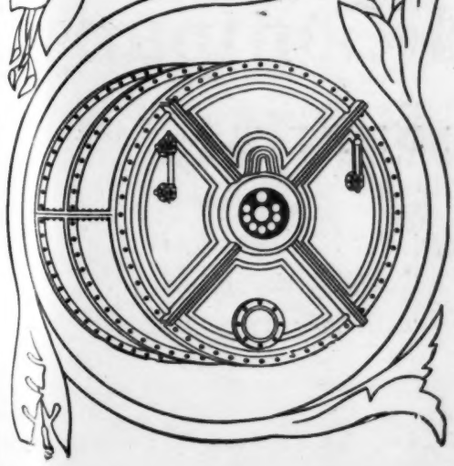








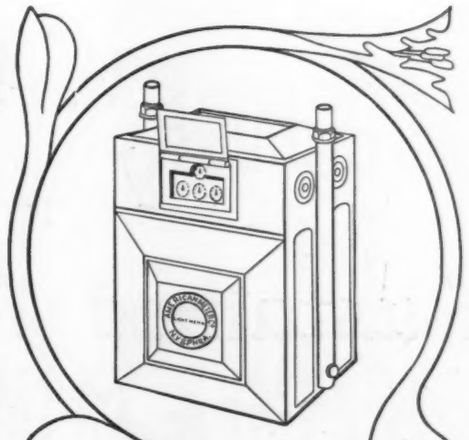
PUBLIC LIGHTING TABLE.

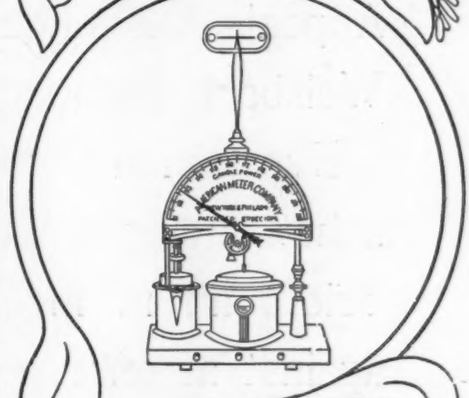
MAY, 1899.

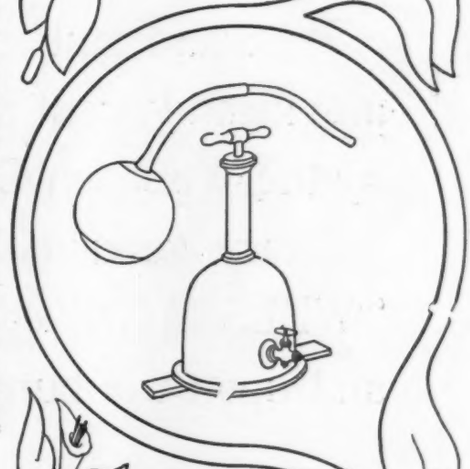
Day of Week.	Table No. 1. Following the Moon. Date.	Light.	Extinguish.	Table No. 2. New York City. All Night Lighting. Light.	Extinguish.
				P.M.	A.M.
Mon.	1	7.30 PM	1.40 AM	6.45	4.00
Tue.	2	7.30 LQ	2.20	6.45	4.00
Wed.	3	7.30	2.50	6.45	4.00
Thu.	4	7.30	3.20	6.45	4.00
Fri.	5	7.30	3.40	6.45	4.00
Sat.	6	7.30	3.50	6.45	4.00
Sun.	7	7.30	3.50	6.55	3.40
Mon.	8	7.30	3.50	6.55	3.40
Tue.	9	7.30 NM	3.50	6.55	3.40
Wed.	10	7.30	3.50	6.55	3.40
Thu.	11	7.30	3.50	6.55	3.40
Fri.	12	7.30	3.50	6.55	3.40
Sat.	13	7.30	3.50	6.55	3.40
Sun.	14	10.30	3.40	7.00	3.30
Mon.	15	11.00	3.40	7.00	3.30
Tue.	16	11.20	3.40	7.00	3.30
Wed.	17	11.50 FQ	3.40	7.00	3.30
Thu.	18	12.10 AM	3.40	7.00	3.30
Fri.	19	12.40	3.40	7.00	3.30
Sat.	20	1.10	3.40	7.00	3.30
Sun.	21	1.30	3.40	7.10	3.15
Mon.	22	2.10	3.40	7.10	3.15
Tue.	23	No L.	No L.	7.10	3.15
Wed.	24	No L. FM	No L.	7.10	3.15
Thu.	25	No L.	No L.	7.10	3.15
Fri.	26	7.50 PM	10.10 PM	7.10	3.15
Sat.	27	7.50	11.00	7.10	3.15
Sun.	28	7.50	11.40	7.15	3.15
Mon.	29	7.50	12.20 AM	7.15	3.15
Tue.	30	7.50	12.50	7.15	3.15
Wed.	31	7.50 LQ	1.20	7.15	3.15

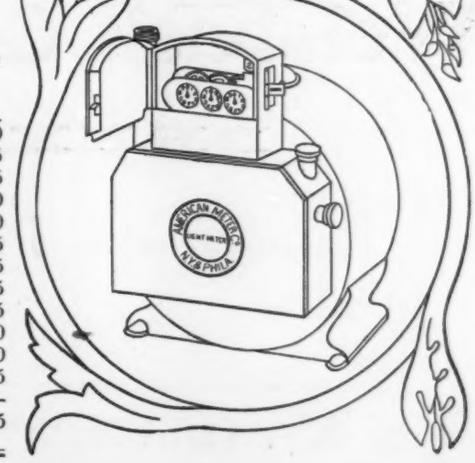
TOTAL HOURS LIGHTING DURING 1899.

By Table No. 1.	Hrs.Min.	By Table No. 2.	Hrs.Min.
January	215.40	January	423.20
February	184.40	February	355.25
March	187.40	March	355.35
April	166.50	April	298.50
May	158.00	May	264.50
June	140.50	June	234.25
July	150.30	July	243.45
August	168.30	August	280.25
September	179.50	September	321.15
October	213.20	October	374.30
November	217.00	November	401.40
December	238.10	December	433.45
Total, yr.	2221.00	Total, yr.	3987.45









Welsbach Patent
Sustained by Court of Appeals.

Judge Shipman, in the United States Circuit Court of Appeals, has rendered a decision finally sustaining the Welsbach Company's patent.

Every manufacturer, seller or user of incandescent gas lights other than the Welsbach is, in view of this decision, an infringer. All infringers will be proceeded against at once.

We again caution the public against the purchase of any incandescent mantle other than that made and sold by the Welsbach Company or its agents.

Every genuine Welsbach lamp has the trademark "WELSBACH" conspicuously printed upon the package and upon the burner itself.

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DREXEL BUILDING,

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Standard Lowe Water Gas Apparatus

Constructed During 1898

BY

THE UNITED GAS IMPROVEMENT COMPANY

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Portland, Me.	1	7 ft. 6 in.	
Washington, D. C.	4	8 ft. 6 in.	
Philadelphia, Pa.	20	8 ft. 6 in.	
Norfolk, Va.	1	7 ft. 6 in.	(Second Contract.)
Trenton, N. J.	2	7 ft. 6 in.	
Flint, Mich.	1	4 ft.	
Jenkintown, Pa.	1	5 ft.	
Yonkers, N. Y.	1	8 ft. 6 in.	
Paterson, N. J.	1	8 ft. 6 in.	
Waterbury, Conn.	1	8 ft. 6 in.	
Chicago (Ogden Gas Co.)	1	8 ft. 6 in.	(Second Contract.)
LaFayette, Ind.	1	5 ft.	(Second Contract.)
Lynn, Mass.	1	7 ft. 6 in.	(Second Contract.)
Mt. Clemens, Mich.	1	4 ft.	
New Brunswick, N. J.	1	6 ft.	
Pittsfield, Mass.	1	5 ft.	(Second Contract.)
New York (East River Co.)	2	11 ft.	(Second Contract.)
Johnstown, N. Y.	2	6 ft.	
Waukegan, Ill.	1	5 ft.	
Chester, Pa.	1	6 ft.	(Second Contract.)
Somerville, N. J.	1	4 ft.	
Hackensack, N. J.	1	6 ft.	(Second Contract.)
Torrington, Conn.	2	5 ft.	
Glassport, Pa.	2	5 ft.	

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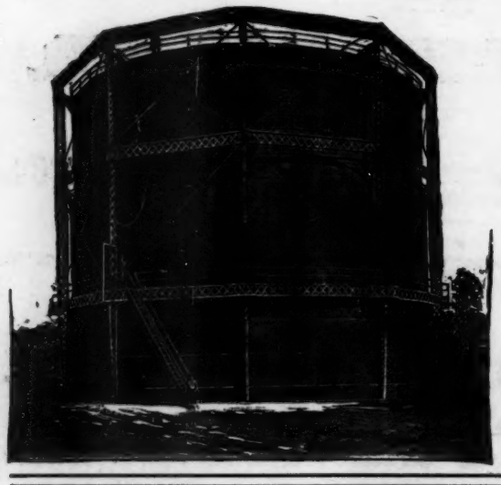

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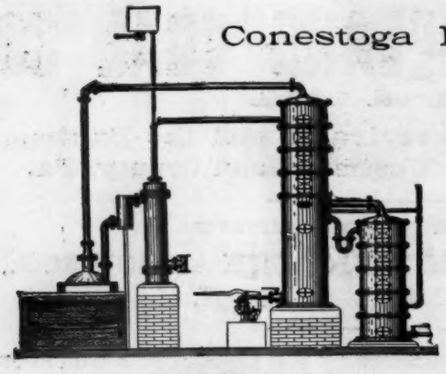

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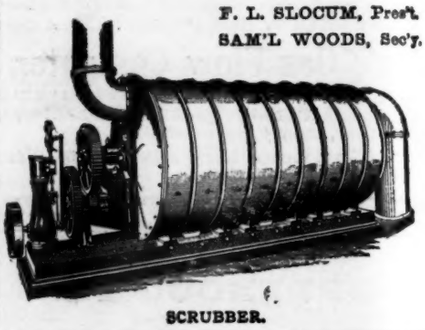

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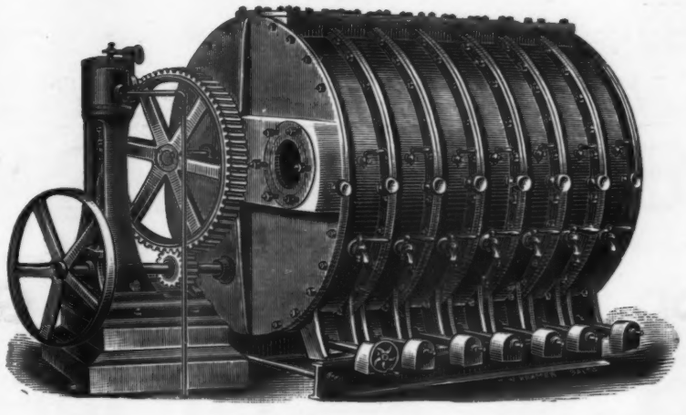

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MR. E. H. YORKE, NEW HAVEN, CONN., Dec. 1, 1898.

Dear Sir:—I am in receipt of a copy of "Excerpts from the Decisions of the Board of Gas Commissioners," which is a handy compilation in book form of extracts from the most recent decisions of the Gas Commission of Massachusetts.

I note that most of these extracts are broad and safe-guiding precepts, which apply with equal force to one Company as to another. The 13 years' existence of the Board of Gas Commissioners with its unusual opportunities for acquiring information, have justly made it a high and safe authority in all matters pertaining to the management, obligations, and rights of Gas Companies. Your little book will serve as a valuable reference library in settling legal complications which often arise between a Gas Company and its customers.

Yours truly, (Signed) F. C. SHERMAN, Superintendent.

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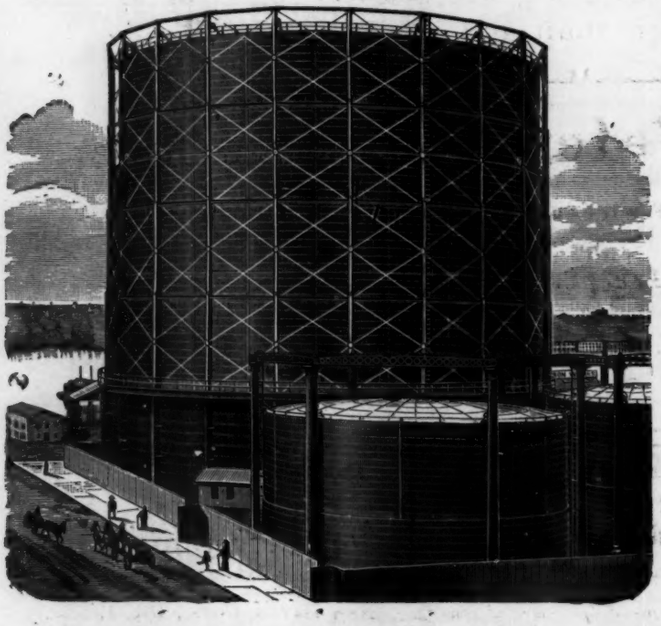

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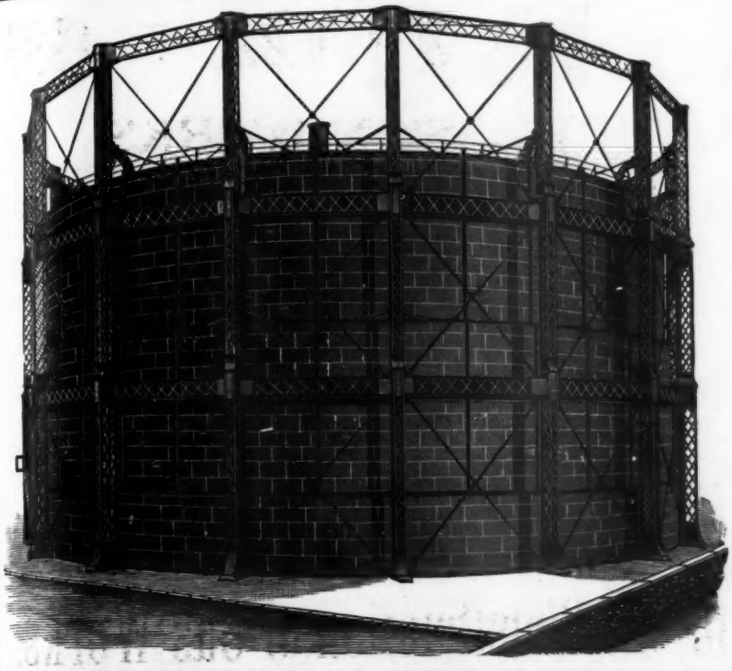

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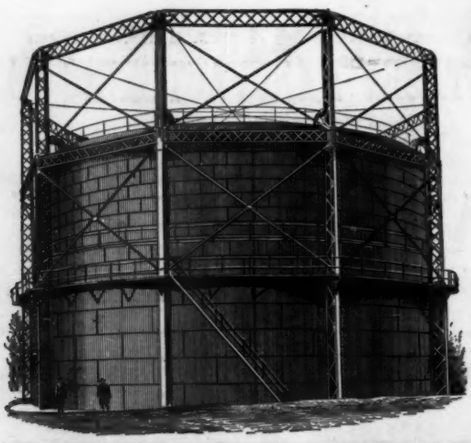

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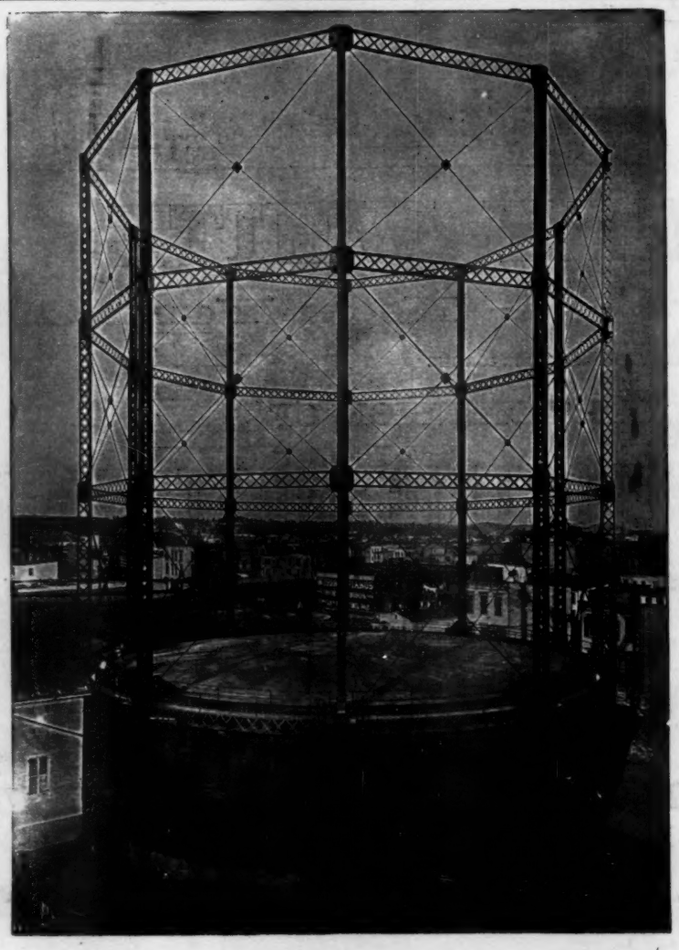

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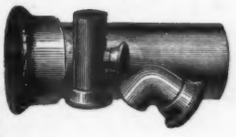

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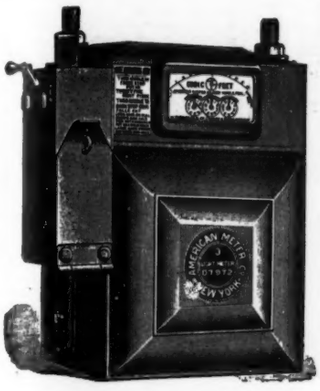

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